COMMERCIAL FISHERIES
ABSTRACTS

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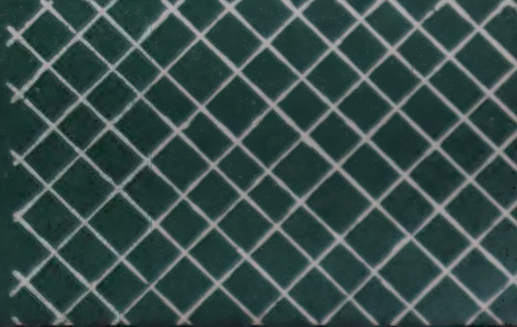
FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES



USE OF FUNDS FOR PRINTING THE ABSTRACTS WAS APPROVED BY THE DIRECTOR OF THE BUREAU OF THE BUDGET, FEBRUARY 15, 1963

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

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1.0162 S. AFRICAN HAKE PROSPECTS
(*)

Anonymous
World Fishing 16, No. 10, 60-62 (October 1967)

Declining catch rates for commercial species of demersal fish in the North Atlantic have reduced the profitability of fish to the extent that many of the European nations have begun to exploit resources further afield. One such resource is the stock of Cape hake off the south-western coast of Africa, which is attracting fishing vessels from many European countries and from Japan. Exploratory fishing by Spanish and Japanese vessels along the western coast of Africa in the early 1960's resulted in commercial fishing ventures by both Spanish and Japanese vessels. Vessels from several other European nations soon started commercial fishing operations. The increased amount of fishing by nations other than South Africa lead to a spectacular increase in total landings, which rose from 100,000 tons in 1961 to over 300,000 tons in 1965.

The Cape hake around the southern coast of Africa are distributed over the Continental Shelf from Port Elizabeth in the southeast, around the southern tip of Africa, and northward along the west coast to Angola. It is known that hake make daily vertical migrations and that the fish rise off the bottom and become most dispersed at night. The Cape hake fishery is traditionally a daylight one; catch rates at night fall to one-half to one-third of the daytime level.

Data on catch and fishing effort are available for 1955-62 and for 1966 from fishing logs, which give the duration of tow and quantity of fish caught in each

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 ABSTRACTER: M. F. Tripple

2.11 CATCH AND NUMBER OF HAULS IN THE SAME DEPTH ZONE CONDUCTED BY THE DANISH SEINERS OF A BERING SEA FISH-MEAL FLEET, IN RELATION TO THE POWER OF THEIR MAIN ENGINE
(*)

Minami, Shiro, and Hiroshi Maéda (Lab. Fish. Technics, Dept. Fish., Shimonoseki Univ. Fish., Shimonoseki, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 8, 731-737 (August 1967)

In a fishmeal fleet comprising 22 Danish seiners, those with more powerful engines tended to catch more fish than did those with less powerful engines. Yet the fishing method used by the boats in the fleet suggested that the tendency was due neither to differences in the size of the nets nor to differences in dragging power of the engines but to differences in their suitability for the pulling and hauling operation. The question then arose: Will the boats with the more powerful engines make better catches than the others will regardless of the depth zone they fish? To answer the question, the authors examined fishing records of the catches made in three different depth zones (50-100 m., 110-120 m., and 130-150 m.) by boats having 220-, 250-, 270-, 290-, 320-, and 340-horsepower engines.

The examination showed that the boats with engines of more than 290 hp. made better catches in the 130-150 m. zone than in the 110-120 m. zone. In contrast, boats with engines of less than 290 hp. caught fewer fish in the deep zone than in the middle zone, possibly because they made fewer hauls in the deep zone. The average daily catch decreased with a decrease in the number of daily hauls.

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 ABSTRACTER: L. Baldwin

1.21 SPATIAL AND TEMPORAL DISTRIBUTION OF ANCHOVITA IN THE ARGENTINIAN EPICONTINENTAL SEA; RELATION TO THE PELAGIC FISHERY DEVELOPMENT [DISTRIBUCION ESPACIAL Y CRONOLOGICA DE LA ANCHOVITA EN EL MAR EPICONTINENTAL ARGENTINO; RELACIONES CON EL DESARROLLO DE LAS PESQUERIAS PELAGICAS]
(*)

Angelescu, Victor, and Maria B. Cousseau
CARPAS, Documentos Tecnicos No. 9, 48 pp. (March 1967) (Comision Asesora Regional de Pesca para el Atlantico Sudoccidental Rua Jardim Botanico, 1008, Rio de Janeiro, Brazil)

The present knowledge concerning the spatial and temporal distribution of anchovita (Engraulis anchoita) in the Argentinian epicontinental sea is summarized. The data obtained from the summary are used to determine the possibility of expanding the present area and period of commercial exploitation of the anchovita stocks and to explore methods of increasing the development of the pelagic fisheries. First, a statistical examination is made of the seasonal catches of anchovita as compared with the total production of the marine fisheries for the past 35 years. Second, the geographical and ecological limits of the anchovita distribution in the Argentinian sea are established. Third, using the obtained data, it is possible to determine with greater accuracy the areas of spawning, trophic and winter habitats, and the route and sequence of the seasonal migration.

The data analyzed and interpreted in this paper led to the following conclusions. (1) The present production of the commercial anchovita fisheries is

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 ABSTRACTER: M. F. Tripple

2.111 DETERMINATION OF THE OPTIMUM SCOPE OF A MOORED BUOY

Morrow, Bertan W., and Wen F. Chang (University of Miami, Department of Civil Engineering, Coral Gables, Florida)
Journal of Ocean Technology 2, No. 1, 37-42 (December 1967)

A reasonable estimate of the scope (the relation between the mooring line and the depth of the water) of minimum tension for deep-water moorings is economically important, since the cost of mooring cable is often a significant part of the total cost of the installation. Moreover, the life of the mooring is closely related to the amount of tension on the cable. Assuming that buoy motion is not objectionable, the authors have defined optimum scope as the scope that produces the minimum tension in the cable for a given current velocity.

The maximum tension on the mooring line of a buoy may occur at the buoy, the anchor, or some intermediate point, depending on the weight of the cable. A short scope mooring will drag the buoy down in the water and, by introducing large buoyancy and drag forces, create high tension in the cable at the buoy. On the other hand, an excessively long, neutrally buoyant cable will create great tension at the anchor, owing to the extra drag of the current on the cable. Since a lightweight cable used for both taut and very slack moors will cause excessive tensions, the authors assumed that there is an intermediate scope of minimum tension. This scope of minimum tension will occur when the cable at the anchor parallels the bottom. Increasing the cable length beyond this point has no practical significance.

(over)

 ABSTRACTER: L. Baldwin

SOUTH AFRICAN HAKE FISHERY

DISTRIBUTION OF ANCHOVITA IN THE ARGENTINIAN EPICONTINENTAL SEA

RELATION OF ENGINE POWER TO CATCH

DETERMINING THE OPTIMUM SCOPE OF A MOORED BUOY

1.21

quantitatively much lower than the potential of the stocks. This was determined by collating the values established for the total number of days of fishing per season with the average catch per unit of effort during a fishing day. (2) The distribution of the anchovita stocks was between latitudes 36° S. and 46° S. along the coast and the intermediate and offshore areas of the Continental Shelf. The surface isotherm of 13° C. during the warmest month is the thermal limit of the school's dispersion area in the summer. (3) During their annual cycle, the anchovita migrate periodically between the offshore and coastal area. The stocks distribute themselves in three different habitats--spawning, feeding, and winter habitat. (4) During the warm season the schools live in the intermediate and outer areas of the Continental Shelf in the upper layer of the sea between 0 and 50 meters. The thermal limits of the spatial distribution of the anchovita at this time of year are between 13° and 18° C. (5) A close ecological-trophic relation exists between the presence of anchovita schools in the offshore areas, the predominant food during the summer-feeding period, and the centers of upwelling waters of subantarctic origin. There is evidence of a superposition between the area of greater primary productivity, the trophic habitat of the anchovita, and the area of large yields of hake. (6) The anchovita schools in the high seas areas are largely composed of adults measuring 125-185 mm. in length. The individuals at this stage of life are characterized by progressive fattening and a high lipid content of 12 to 15 percent. [114 references]

(Abstract of this article appears under 1.0162 page 3 - February 1967)

Anonymous
World Fishing 15, 23 (April 1966)

1.21 SOUTH AFRICANS INVITED TO "HAMMER" ANCHOVY STOCKS

2.111

A theoretical method for determining the behavior of the mooring line is presented in this article. The major parameters are the drag force (R), the cable weight (W), and the effect of buoy behavior upon the shape and tension of the line. The drag force per unit length of cable depends on the drag coefficient (C_d), the velocity (V) and density (e) of the water, and the cable diameter (d). Then $R = C_d \, e \, d \, V^2/2$. Because the cable is inclined to the current, the horizontal drag force on an intermediate element of the cable is equal to R sin θ. The component of the drag force that is perpendicular to the cable (F) is then equal to R $\sin^2 \theta$; the component that is tangential to the cable (G) is equal to R $g(\theta)$, where $g(\theta)$ is a function of the cable angle at that point.

Letting T represent the tension at any point, T_o the tension at the buoy, θ_o the cable angle at the buoy, and S the length of the cable, the authors derived the following equations:

$$T = T_o e^{\int_{\theta_o}^{\theta} \frac{Rg(\theta) - W \sin \theta}{R \sin^2 \theta + W \cos \theta} d\theta}; \quad S = \int_{\theta_o}^{\theta} \frac{T_o \, e^{\int_{\theta_o}^{\theta} \frac{Rg(\theta) - W \sin \theta}{R \sin^2 \theta + W \cos \theta} d\theta}}{R \sin^2 \theta + W \cos \theta} d\theta$$

Similar equations were derived for finding the depth at any point and the horizontal coordinate of any point on the cable.

1.0162 (Cross Reference: 1.53)

haul. The average catch rate on the hake grounds in 1966 was 0.6 tons per hour. This figure can be compared with an average catch rate at Iceland in 1966 of about 0.3 ton per hour.

At the present time, there are no international regulations controlling fishing in the southeast Atlantic. The South African government has introduced regulatory legislation that requires South African hake trawlers to use a minimum cod-end mesh of 4 in., prohibits landing hake smaller than 20 in., and prohibits discarding hake at sea that could be landed for fish meal. The majority of vessels of all nations appear to use a cod-end mesh of about 4 in.; however, vessels have been seen using trawls with meshes smaller than 4 in.

As reflected by the catch rates, the abundance of fish has declined as the amount of fishing has increased. The 1966 catch rate on the hake grounds fell to slightly below half of the unexploited level, which indicated that the present catch is close to the maximum sustainable yield. Further increases in the amount of fishing would not increase the total landings, and the catch rate would further decline. The stage has probably been reached in the Cape hake fishery when serious consideration should be given to the effect on the long-term yield of using trawl cod-end meshes of the size now in use, and whether the fishery would benefit from an increased minimum mesh size.

Schmidt, U. (Institute for Deep Water Fisheries, Federal Fisheries Research Center, Hamburg, Germany)
Fette-Selfen Anstrichmittel 68, No. 12, 1052-1057 (December 1966) (In German)

1.0147 PRELIMINARY RESULTS OF THE FIRST FISHERIES EXPEDITION IN THE SOUTH ATLANTIC

2.11

When no more than seven hauls were made, the average daily catch in the shallow and the deep zones varied greatly from boat to boat, even when the boats had engines of the same horsepower. The average daily catches varied less from boat to boat in the middle zone, but they, too, did not depend on the power of the engines. The average daily catch of eight or more hauls was directly related to the power of the boat's main engine; the regression coefficient seemed to become larger with depth.

The relation between the power of the main engine and the catch was quite noticeable for catches made in the deep zone; it was less pronounced for catches in the shallow zone. The number of daily hauls was not related to the power of the the engine of any boat in any depth zone.

Watanabe, Toru (Shimonoseki Univ. Fish., Shimonoseki City, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 7, 607-612 (July 1967) (In Japanese; English summary)

Three kinds of specially designed, double-sheet, drift nets were constructed to test their relative effectiveness in catching salmon. The body of the nets had small meshes; the outer wall, varying degrees of larger meshes. Short hanging lines were used to connect the body and the outer wall, which were about the same in depth. For comparison, three other nets, one of which had no outer wall, were also tested. The net in which the meshes of the outer wall were three times larger than the meshes of the body caught 142±14 percent more salmon than did the ordinary net without walls. [Abstracter: L. Baldwin]

2.1112 ON THE CATCH OF SALMON WITH SPECIAL DOUBLE SHEET NET

2.1121 GENERAL PURPOSE TRAWL FOR THE 100 H.P. VESSEL

Anonymous
World Fishing 17, No. 1, 20-21 (January 1968)

A general purpose trawl has been designed for use as a bottom trawl, as a single- or double-boat midwater trawl, or as a Danish-type seine net when extended wings are used. Changing the cod end converts the trawl from sprat to herring fishing.

The basic characteristics of the trawl are a "box" construction with headline and footrope of equal length, high headline height, floating belly, batings, and cod end. The lastrich lines, which are the main towing points and determine the conformation of the net, are of simple construction and have great towing strength. The mesh sizes, gauge of synthetic twine, and dimensions can be varied to suit the type of fishing and the horsepower of the vessel. The described form of the trawl is designed for a 100-200 hp. vessel towing at a minimum of 3 knots.

The length of both headline and footrope is 70 feet, and the trawl mouth is composed of 100-mm. meshes. The 70-ft. length is composed of two 26-ft. wings and an 18-ft. bosom. The spread between ends of wings is estimated at 45 ft. From the wings, 10-ft. tow legs extend to heavy, swiveled Danlenos, which also act as sinking weights when the net is used for midwater trawling. The fishing line has chain toggles through which a footrope with bobbins runs for bottom trawling.

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 ABSTRACTER: M. F. Tripple

2.116 (*) ISOBARIC BUOYS--A NEW CLASS OF SUBSURFACE FLOATS

Adler, Cyrus (Graduate Department of Marine Science of Long Island University, Greenvale, New York)
Journal of Ocean Technology 2, No. 1, 43-49 (December 1967)

Isobaric buoys are free-floating instruments that are approximately neutral in buoyancy. They automatically maintain themselves in the water at a preset pressure level by means of transducers that sense water pressure. Once the pressure is sensed, the buoys either propel themselves vertically or adjust their density to effect the hovering dictated by the preset level.

Isobaric buoys are especially useful for tracing currents in shallow waters or in other marine environments where temperatures change abruptly. The nature of their oscillations gives indications of the stratification of the water in which they float. They are also useful for sensing temperatures, salinity, or sound in the water.

In addition, other measuring and recording modules could be strapped to their casing without seriously affecting the level-holding capability. For example, a buoy could be programmed to descend to a particular depth, take readings as it drifts with the current, and then rise to the surface to transmit its data to an aircraft or a satellite. Thus the need for slow, expensive surface ships could be eliminated.

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 ABSTRACTER: L. Baldwin

2.113 (*) NEW CHEMICAL BREAKS DOWN OIL; HAS ANTI-POLLUTION POTENTIAL

Anonymous
National Fisherman 48, No. 6, 18A (September 1967)

A new chemical complex that can disperse oil slicks at sea, clean oil-covered beaches, or clean holds in boats may be of value to oil companies, conservationists, and fishermen. In effect, the chemical "homogenizes" oil and water and breaks down the composition of oil so that the action of bacteria, oxygen, and light can complete the dispersion of the oil.

Various weights of oil require varying quantities of the complex to be most effective, but a gallon of the chemical complex can disperse about 10 gallons of heavy oil. Under ideal conditions, a ratio of 15:1 is most effective. The chemical is soluble in either fresh or salt water. It is noncorrosive and can be used to remove oil from steel bulkheads. Considerable savings in time and money result from using the chemical as a cleanser. Solutions of the complex can be stored in unlined steel tanks for months and reused. It is possible to mix the chemical with salt water and clean out the fuel tanks of ships at sea.

The complex has a specific gravity less than that of sea water, so it tends to rise. Dispersion is best accomplished where there is a great depth of water. Most dispersion is concentrated in the upper levels of the water, with the bottom remaining almost free of the complex. Contact with animals on the ocean floor is

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 ABSTRACTER: M. F. Tripple

2.116 JAPANESE FISHING SYSTEM RECORDS HEIGHT OF NET AND SHAPE OF MOUTH

Anonymous
Canadian Fisherman 54, No. 10, 18, 21 (October 1967)

A Japanese net recorder comprises a unique system of instruments that tells the fishing captain the actual shape of the net at all times, the amount of fish entering the net, and the condition of the sea bed. The recorder is suitable for bottom trawls, midwater trawls, and floating trawls. The advantages of being able to control the shape of the net's mouth and the depth of the net are obvious, and the developers of the net recorder believe it is one of the most important fishing gears they have ever developed. The recorder can be used independently or in combination with a fish finder.

In a sense, the net recorder is a fish finder in a wireless synchronization system, which consists of a transmitter, a receiver, and an indicator, or recorder. The transmitter unit is fitted on the trawl net; it emits ultrasonic pulses and receives their echoes. This information is picked up by the receiver unit being towed by the boat and is used for the detection of underwater objects. The indicator, or recorder, unit, aboard the boat amplifies the signal from the receiver and records it on electrostatic paper. The record on paper indicates the shape and height of the trawl net during the towing operation and shows the existence of fish entering the net. The record can also indicate any possible damage to the

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 ABSTRACTER: M. F. Tripple

GENERAL PURPOSE TRAWL

CHEMICAL TO DISPERSE OIL

ISOBARIC BUOYS

JAPANESE NET RECORDER

2.113 (Cross Reference: 9.19)

minimized, and the oil is present at levels where the disintegrating oxygen, light, and bacteria can be most effective. Tests showed that the mixture had little or no toxic effects on finned fish in a 12-hour contact period. The complex could be of value to certain types of fishing and rescue operations. Even with no oil present, addition of the complex to the surface of choppy waters resulted in a smoothing of the waves over a large area. The smoothing effect lasted for 30 to 60 minutes.

The uses to which the complex may eventually be put are extremely varied, whether on land or sea, with fresh-water or salt water. The methods of application and the optimum quantities and solutions are still being developed and refined.

2.113 ALL-PURPOSE DETERGENT FOR SHIP CLEANING

Anonymous
Marine Engineering/Log 70, No. 6, 86 (1965)
World Fisheries Abstracts 16, No. 3, 1 (July-September 1965)

An all-purpose detergent that removes rust stains, soils, and salt-water residues from ships' sides, decks, bulkheads, and stacks is described. The cleaner is a liquid that can be sprayed on with a portable, air-operated pump. The detergent is also said to be suitable as a paint base. [Extractor: L. Baldwin]

2.1121
For midwater trawling, the footrope is replaced with a weighted wire rope with the toggles running free.

The headline is of 2-in. polypropylene, and the fishing line is of 2-in. manila. The lastrich side ropings are of 1½-in. polypropylene. The headline and fishing line each have a breaking strain of 3 tons, and the side ropings have a breaking strain of about 2 tons, which gives a concerted strength of almost 8 tons.

The mesh size of the belly and batings, the corresponding top section, the wings, and side panels is 4 in. The mesh size of the funnel and cod end is reduced to 75 mm. The cod end is constructed of double mesh. Sprat or herring cod ends can be added to the funnel. The meshes are also doubled at the quarters between wing and bosom for added strength. Joining points have doubled meshes.

The fishing dimensions of the net as estimated by the designer are 15-20 ft. from headrope to footrope and 30 ft. for the horizontal opening, excluding wings.

The net is made of two identical horizontal sections and two identical side panels. Instructions are given for constructing and assembling the general purpose trawl.

2.116

net. The net recorder can be effectively used for both catching fish and for oceanographic investigation.

Numerous benefits are derived from using the net recorder. Fish entering the net can be plotted continuously. The efficiency of the fishing operation can be improved because towing time can be adjusted after the amount of fish entering the net is charted. Observations of the sea bed allow off-bottom trawling on a rough bottom without damaging the net. The condition of the net can be noted at all times, which gives the following information; the time taken from casting to reaching the sea bed; the shape of the net while it is being lowered--thus any abnormalities in the shape can be easily detected and corrected; and the height of the net as it is being towed. Other advantages include detection of obstacles of the sea bed, detection of a damaged net to avoid wasted fishing time, and easy detection of a lost net because of signals emitted from the transmitter unit attached to the net.

Three models of the net recorder are available, one for midwater trawling, one for bottom trawling on small- and medium-sized boats, and one for bottom trawling on larger vessels. The range of the recorders is from 110 fathoms for the midwater trawling model to 1,200 meters for the large-vessel bottom-trawling model.

2.116 (Cross Reference: 9.11)

The author discusses a number of hovering and control systems (including three that have been built in the United States) that have been incorporated into this class of subsurface floats. [14 references]

2.1129 LIGHTS FOR BUOYS

Anonymous
France Pêche No. 112, p. 163 (December 1966) (In French)
World Fisheries Abstracts 18, No. 2, 1 (April-June 1967)

A Norwegian firm is now producing a light for the buoys used to locate and protect fishing gear. The device, known as LC1, is designed to fit the Polliform type of buoy, which has a central hole with a pole in it. Included in the device is a tube containing four batteries and an independent source of light, which is equipped with a transistorized, electronic generator of impulses and a bulb covered by a plastic cap. Both the tube and generator parts are absolutely waterproof and are connected by a waterproof wire.

The signal flashes 75 times per minute and lasts 100 hours with a set of four 1.5 volt batteries. The flashing light may be seen for a distance of 2 miles.
[Extractor: M. F. Tripple]

2.117 A TECHNICAL REVIEW OF FERRO CEMENT CONSTRUCTION

Alexander, D. (Alexander and Poore, New Zealand)
Commercial Fishing 6, No. 8, 11, 13, 15 (August 1967)

Ferro-cement construction of vessels is technologically simple and requires few skills and machines. It utilizes a high content of indigenous materials that are low in cost. Sand, cement, wire netting, and steel rods are the basic inventory for ferro-cement construction; pipe frames, cement additives, and tie wire are the only additional materials needed. Ferro cement provides a satisfactory means of achieving a complex form. A full-displacement molded hull, typical of advanced trawler design, represents the form best adapted to ferro-cement construction. Cement is strong in compression, so it forms a shell of surprising flexibility and strength when used effectively. Ferro-cement vessels are easily painted; the development of epoxy resin paints permits the application of a durable coating that is both protective and decorative. Epoxy cements have a good compatibility with cement mortars, which allows easy repair and patching of damaged areas of a ferro-cement boat. A final advantage is the ease with which insulation and soundproofing can be integrated into the hull during construction.

The general construction methods with ferro cement used in New Zealand feature a steel matrix upon which a cement mortar is plastered. The steel matrix is built up to a pipe-frame form. Each frame reproduces the lofting of the vessel's lines, which must be precise to achieve good fairing. A high-tensile

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 ABSTRACTER: M. F. Tripple

2.119 THE FLOATING IGLOO

Anonymous
Norwegian Fishing and Maritime News 14, No. 2, 39 (1967)

A Norwegian lifesaving raft is the first raft approved according to the requirements stated by the International Convention for Safety at Sea, London, 1960. The square, semirigid raft is built of flexible, expanded foam plastic with closed pores and covered by strong, coated nylon cloth. The strength and elasticity of this construction make the raft unbreakable so that the raft cannot be seriously damaged when launched or beached. During demonstrations, the raft was lifted by a crane and dumped on a pier without any noticeable damage. The flexibility of the raft also prevents injuries to persons entering the raft in bad weather.

The raft is identical on both sides--it has two identical hand-released, self-raising canopies, two openings, and two ladders to facilitate being entered. The canopies are made of strong, light-reflecting nylon material that makes the raft visible from a long distance. The canopies are fitted with light-reflecting tape and a new type of radar reflector that gives a strong echo over long distances under adverse conditions. The material of the raft and the canopies give good insulation against the cold weather and water. Rain water can be gathered on the canopy roof and tapped via a thin hose in the center of the canopy. In tropical climates, the temperature inside the raft can be lowered by cooling the canopy roof with water.

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 ABSTRACTER: M. F. Tripple

2.117 MANNED SUBMERSIBLES FOR RESEARCH

Arnold, Henry A. (Ocean Engineering, National Council on Marine Resources and Engineering Development, Washington, D.C. 20500)
Science 158, No. 3797, 84-95 (October 6, 1967)

During the past few years, small submersible vessels have been developed as a new and effective tool of geology, acoustics, marine biology, and physical oceanography. As with all tools, the submersible has special capabilities and limitations. Methods of use and needed improvements are being identified and scientists and engineers in government and industry are responding so that advances can be made toward both simple, less expensive vehicles and complex, high-performance vehicles.

Because present technology does not allow for large, deep-diving submersibles and because of costs, the research submersible is usually small. However, the small submersible is able to go to relatively deep depths and to maneuver safely within a few feet of the bottom. Multiple viewing ports are highly desirable, if not essential. A few knots of forward speed, an underwater endurance of about 8 hours, and several hundred pounds of instruments, cameras, lights, sensors, and data recorders are necessary.

There is a continuing need to make scientists in many fields aware of the capabilities and possibilities of research submersibles. This can be done quite

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 ABSTRACTER: M. F. Tripple

2.12 (*) STUDIES ON THE TRAWL FISHING GROUNDS OF THE EASTERN BERING SEA. I - ON THE OCEANOGRAPHICAL CONDITION AND THE DISTRIBUTION OF THE FISH SHOALS IN 1963

Maeda, Tatsuaki, Takeji Fujii, and Kiyoshi Masuda (The Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 8, 713-720 (August 1967)

In a previous paper (1960), the authors showed that changes in the temperature of the ocean bottom affected the movement of yellowfin sole, Limanda aspera (Pallas), in the eastern part of the Bering Sea. In this paper, they compare the oceanographic conditions found in 1963 with those found in 1960. They also report on the distribution of Alaska pollack, Theragra chalcogramma (Pallas), as well as of yellowin sole.

Oceanographic conditions.--The temperature of the ocean bottom in the central part of the cold water mass was 1° C. higher in 1963 than it was in 1960. The isothermal line of 0° C. was found only near the southeastern part of St. Matthew Island in 1963, whereas in 1960 it extended from southeast of the island to 57° N. 164° W. In 1963, open sea water of high salinity was found only in the southern part of Bristol Bay; in 1960, it extended from the southern part of the Bay across to the north side of the cold water mass.

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 ABSTRACTER: L. Baldwin

REVIEW OF FERRO-CEMENT CONSTRUCTION

RESEARCH SUBMERSIBLES

LIFESAVING RAFT

DISTRIBUTION OF SOLE AND POLLACK IN THE BERING SEA

effectively by taking prospective investigators on a dive; however, space is limited and dives cost money. There is also a need for intelligent construction standards and safeguards, both to enhance safety and to provide a basis for insurance rates. Regulation of construction and operation is necessary but it should be kept to a minimum to encourage this infant technology.

The unique advantages of the manned submersible for research and exploration began with its ability to take a scientist to the site of his observations or experiments, even though the environment be hostile or distant. Despite the existence of sophisticated instrumentation, man, with his versatile and flexible senses, best serves the needs of scientific observation. Contrary to a surface ship, the free-running submersible is not affected by the motion of the sea surface, which is a unique advantage when placing objects precisely on the bottom, making gravity measurements, or floating with a current at depth.

The manned submersible does have some fundamental disadvantages and limitations. Because of its size and short range, it must be carried or towed to the diving site. The submersible cannot operate in heavy seas owing to the dangers inherent in launching or recovering when the submersible and the support ship are responding differently to the waves. When trimmed for neutral buoyancy, the total weight of the submersible must equal the weight of the water it displaces. The difference between displacement and weight can be allotted to people and research instruments; in most research submersibles, the weight available for this purpose is small.

This article also discusses the costs of submersibles, their principal accomplishments, observations with submersibles, instrumentation, future trends, and other aspects of research with submersibles. [12 references]

Yellowfin sole.--In July 1963, yellowfin soles were found in large numbers on the north side of the cold water mass, in limited numbers at the center of the mass, and not at all on the south side of the mass. The shoals moved from the northwestern part of Unimak Island to the shallow coast of Bristol Bay in April, May, and June. In July, with the rise of bottom temperatures in shallow waters, the shoals moved off shore, migrating northwestward across the area around 57°30′ N. 163° W. As the temperature of the coastal water increased, so did the density of the shoals in the cold water regions.

Alaska pollack.--In July 1963, Alaska pollacks were found in large numbers on both the east and the south side of the cold water mass. Since they are controlled by open sea water having high temperature and salinity, they were not found on the north side of the mass in July. Large amounts of Thysanoessa raschii and Parathemisto libellula, which live near the surface of the water, were found in the stomachs of the pollack. Thus, it is logical to conclude that the distribution of this fish is related to water conditions at other depths than just those near the bottom. [11 references]

(Abstract of this article appears under 1.0117 page 1 - May 1967)

Juhl, Rolf
Commercial Fisheries Review 28, No. 6, 1-5 (June 1966)

prestressed wire matrix is laid horizontally and diagonally at suitable points. Four layers of chicken wire are placed to either side of these points. The entire steel complex is tightened by innumerable cross connections that hold the steel matrix within the required thickness and effectively tighten it. The stiffness and resistance to local bending of high-tensile prestressing wire ensures a hull matrix that is free from hollows.

The chicken wire serves three functions. It provides steel in the outermost fibers of the shell that resists tensile forces induced by bending moments, which are asymmetrical stresses. Such forces are unavoidable and occur with severity whenever discontinuities occur in the curved surfaces or whenever areas are loaded with insufficient curvature to develop full membrane forces. The wire mesh also limits the propagation of cracks, which occur whenever concrete is subjected to tensile forces. The dispersion of many steel fibers in cement mortar, which is what the chicken wire does, limits the cracks to short range effects so that the thin shells remain impervious to water. Finally, chicken wire gives a close-knit fabric upon which the cement mortar is easily plastered.

The final step in ferro-cement construction is to coat the surfaces with epoxy paint that is applied to an acid-etched surface. This paint protects the chicken wire near the surface and has a high gloss that is both decorative and inhibitive to growth of marine organisms.

In the middle of the raft is a watertight container for the equipment. The container has watertight lids on both sides, so it makes no difference which side of the raft comes up after launching. When not in use, the raft is stored in a container of fiberglass reinforced polyester on a latticework of specially saturated pine. This cover provides protection for the raft while stowed onboard the ship. The raft is launched by releasing the cover, lifting it off, and throwing the raft overboard while holding onto the painter. The raft may be launched while fully loaded by means of a davit or other arrangement. Should the ship sink without the raft having been launched, its large buoyance will automatically release it and bring it to the surface.

The raft is available in all sizes heavy enough to give good stability in the water. In heavy seas the canopy below the raft can be released so that it will fill with water to give extra stability and act as a sea anchor. The equipment in the raft includes rockets, first-aid kit, knife, rations, and water in the watertight container. The raft is also equipped with a buoyant light, two sea anchors, and a paddle and bailer on both sides. Extra equipment for sailing in arctic waters can be easily stored.

This type of raft does not require an annual inspection ashore. Routine checks may be made by the crew. The raft is patented in 20 countries and is approved by the Norwegian authorities for all types of vessels.

2.1479 SCOTTISH SEINING OFFERS OPPORTUNITY FOR SMALL BOATS TO BOOST CATCHES

Dissel, Derrit J. Van, and Richard L. Lang (Potter and McArthur, Inc., 260 Summer Street, Boston, Massachusetts 02210)
National Fisherman 48, No. 6, 1C, 5C (September 1967)

A new fishing technique being introduced to United States and Canadian fishermen is called "Scottish seining." Scottish seining basically consists of surrounding the area of sea bottom to be fished with two, very long ropes and a net. The net is similar to a conventional bottom trawl except that it is much lighter, with a long wing on each side of the bag. The net is kept open by two warps of manila rope, usually 2½ inches in circumference and a mile or more in length, that are set out between the boat and the net in a triangular shape. When the ropes are towed or winched in, they come together over the sea bottom and scare the fish to the center of the ring, where they are scooped up by the net.

Since Scottish seining combines both dragging and surrounding principles, almost all species of demersal fish, flat or round, can be caught, as can shrimp, lobster, and occasionally herring. The method depends mainly on the pulling power of the winch, so it may be used by smaller, low-powered vessels. Another advantage is that the fish caught are in better condition because the catch generally comes aboard live. The method is very efficient, as a high percentage of the fish are caught owing to the herding action. The success of the seine netting depends

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 ABSTRACTER: M. F. Tripple

2.15 HOLDOVER PLATES PROVE EFFECTIVE IN FREEZING, STORING AT SEA

Anonymous
Quick Frozen Foods 30, No. 3, 55-56 (October 1967)

Vacuum and eutectic holdover plates are being used successfully in the freezing and storage of fish at sea. The use of holdover plates makes it possible for trawlers to stay out longer before returning to defrost plates and deliver a catch. The plates also make possible a much lower-priced installation for freezing and storing fish at sea than had been possible before.

The basic application for the plates utilizes the principle of an overhead refrigerated surface to maintain a desired temperature in a given space. A compressor has been added that can be adapted to belt drive or hydraulic drive by either a diesel engine or an electric motor. If the hatches are kept closed to prevent warm air from entering, this type of system will allow trawlers and fishing boats to stay out for up to 50 days without returning to shore to defrost the plates.

This basic application of plates has often been called a "still air system," which is a misleading term, since there really is no still air in a refrigerated system. The speed at which the air falls is determined by the temperature difference between the air and the refrigerant inside the plates. The system would more properly be called a "gravity air circulation system." The system is quite

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 Abstracter: M. F. Tripple

2.15 FISHING TRIPS LENGTHENED BY NEW SHIPBOARD REFRIGERATION SYSTEM

Anonymous
ASHRAE Journal 9, No. 12, 95 (December 1967)

The development of a new refrigeration system for shrimp trawlers means that they no longer need to depend on ice to preserve their catches. Ships of the Gulf of Mexico and South American fleets can now remain at sea for extended periods with no degradation of product freshness or appearance.

The refrigeration system consists of self-contained, compact marine units that are coupled with a process for immersion freezing, glazing, and storing of the catch at -20° F. Two independent refrigeration units are used, each of which is rated at 1.5 tons at -20° F. Each of the two units can maintain a -20° F. temperature in the hold while handling 95 percent of the fishing rates normally encountered. Because the units are independent, each unit can be rotated in operation every 24 hr. or they can be used simultaneously if the catch rate is excessive.

The condensing sections are located in the engineroom; each section contains a diesel engine, direct coupled refrigeration compressor, a.c. and d.c. alternators, pumps and electrical/mechanical components. A brushless alternator drives the electric motors.

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 ABSTRACTER: M. F. Tripple

2.9 FOOD VALUE OF RED TIDE (GONYAULAX POLYEDRA)

Patton, Stuart, P. T. Chandler (Division of Food Science, Pennsylvania State University, University Park); E. B. Kalan (Eastern Regional Research Laboratory, Philadelphia, Pa.); and A. R. Loeblich, III, G. Fuller, and A. A. Benson (Scripps Institution of Oceanography, University of California, San Diego, La Jolla)
Science 158, No. 3802, 789-790 (November 10, 1967)

The hundreds of square miles of ocean often covered by plankton blooms suggest the substantial quantities of material involved. Economic harvesting of plankton, however, poses difficult technological problems. In addition to the problems of harvesting, the dominant organisms of red tides in California, Gonyaulax polyedra, are reported to be toxic.

As the plankton are too small to be recovered economically, they are eaten indirectly as components of the fish that have fed on plankton. There is always a loss of efficiency during passage of nutrients along a food chain, so it is important to determine the nutritive value of plankton to nonaquatic species of animals. The authors tested the nutritive value and protein quality in samples of red tide.

Gonyaulax polyedra was the predominant organism found by the authors in the harvests of red tide. Cells were recovered by filtration, packed by sedimentation,

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 ABSTRACTER: M. F. Tripple

SCOTTISH SEINING WITH SMALL BOATS

SHIPBOARD REFRIGERATION SYSTEM

HOLDOVER PLATES FOR FREEZING AND STORING FISH AT SEA

FOOD VALUE OF GONYAULAX POLYEDRA

2.15

The refrigerated air in the hold is circulated by blowers to minimize the temperature gradient and to provide the final temperature reduction of the product from 0° F. temperature of the brine to -20° F. Bin partitions and spacers on the floor and walls provide the thermal envelope surrounding the inner surface of the hold.

The brine immersion tank situated in the aft deck is cooled through a secondary heat-exchanger system that utilizes the -20° F. hold air as the heat sink. Additional heat transfer is obtained through convection losses by partially suspending the tank through the aft deck so that it is exposed to the ambient temperature of the hold. Though less efficient than direct expansion systems, this system reduces system complexity and improves reliability at sea. The secondary heat transfer solution has a glycol base circulated by a pump powered by the a.c. alternator. The secondary heat exchangers and the evaporators are situated in the hold; the secondary exchangers are downstream from the evaporator discharge air.

The brine in the immersion tank is a concentrated salt solution with a high percentage of corn syrup. The brine is thoroughly agitated to uniformly glaze and freeze the bagged product; an average brine temperature of 0° F. is maintained. The prefreezing and glazing results in a fresh quality and prevents dehydration of the shrimp during storage aboard the trawler.

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and held in deep-frozen blocks for later drying to a free-flowing powder. The powder was obtained either by lyophilization or by drying a melted slurry of cells under vacuum. The results of analysis of the dry matter from Gonyaulax (in percentages) were protein, 27.5; ether extract, 4.7; fiber, 19.5; ash, 17.6; and nitrogen-free extract, 30.6. The results of amino-acid analysis are presented in a table. The data on amino-acid composition indicated that the protein of G. polyedra is of good nutritional quality and that the composition of the protein was quite similar to that of casein, a protein known for high nutritional value.

The dried plankton was fed to rats in two trials. The first trial was a simple evaluation of toxicity. When the plankton-fed rats grew as well as the control rats, the authors conducted a second trial to study nutritive quality of the material. Unfortunately, the available amount of processed plankton permitted only an exploratory trial.

Analyses of the nutrient composition of G. polyedra indicated its potential as a source of food. The exploratory feeding trials showed that the rats had good early growth; no toxicity appeared during the feeding period. The factors determining the occurrence, size, and variety of organisms of plankton blooms in the open ocean are not well known, and G. polyedra is not one of the more common varieties of plankton. However, controlled farming of plankton could become an integral part of the recovery of potable water and chemicals from sea water with atomic energy. Drying of plankton may be practical in many arid coastal regions of the world because of the climatic conditions of high heat and low humidity. [9 references]

2.1479

on its silence; there are no heavy doors or rollers. Although the net itself travels over only a small portion of the bottom, the area covered by the warps is extremely large. For equal fishing time, a Scottish seiner will cover about 125 percent of the area covered by a similarly powered dragger. It is common for Scottish seiners to outfish comparative-sized trawlers by 4 to 1.

There are three methods of seine netting: tow dragging, anchor dragging, and fly dragging. During tow dragging, the vessel anchors one end of the first warp with a marker buoy and then runs into the tide about 30 feet off from it. After about two-thirds of the first warp is paid out, the vessel runs across the tide and pays out the rest of the first warp, the net, and one-third of the second warp. The vessel then runs with the tide and picks up the end of the first warp. The vessel continues to run with the tide until the warps have come together, at which time the warps are winched in and the net is brought aboard.

For anchor dragging, a heavily anchored buoy is attached to the end of the first warp and set out. The gear is then set out in a triangular shape around the area to be fished. The vessel returns to the buoy, makes fast, and the warps are pulled in by the winch. Anchor dragging is most effective for flatfish and requires large areas of smooth, clear bottom.

Fly dragging uses the winch and propeller together so that the gear is towed and the ropes are heaved at the same time. The set is made in the same way as with tow dragging but no consideration of wind and tide is necessary. Fly dragging is fast and effective for catching round fish, and it may be used in small areas surrounded by rough bottom.

2.15

simple, as there are almost no controls or moving parts, and the installation is easy and economical.

When shrimp are caught, they are normally spread out in the hold and allowed to cool. This cooling process usually takes from 4 to 6 hr., and during this time there is a considerable loss of moisture due to evaporation. If forced air refrigeration is used, there is even more loss of moisture. The evaporation stops when the outside surfaces of the shrimp become frozen. As an improvement over this method, the use of a sea tank equipped with vacuum plates and placed in the ship's hold is recommended. The sea tank speeds up the cooling process and thus reduces dessication and weight loss. The temperature of the water in the tank is maintained at 30°, which is slightly above the freezing temperature of sea water. The shrimp are placed in the tank and rapidly cooled to a temperature of 30°. After cooling, the shrimp are placed in thin layers in bins, where they are frozen by the overhead plates in the hold. Because the shrimp are already at 30° and because the outside surfaces of shrimp will freeze at about 27°, it takes just a few minutes to freeze the surface and stop evaporation loss.

Another application of the plates is known as the "immersion system." This system requires overhead plates in the storage room, chilling plates in the seawater tank, and an additional tank for the actual immersion freezing of the shrimp. The freezing tank is filled with a solution of water and propylene glycol. By adjusting the percentage of propylene glycol to keep the solution at -10°, the entire body of the shrimp can be frozen in about 20 min. Boats using this system can stay out for as long as 4 to 6 months before delivering their catch.

3.2342 NITROGEN SPRAY FREEZING 'SEALS' FLAVOR IN COOKED LOUISIANA SHRIMP

Doucet, Clarence
Canner/Packer 136, No. 9, 13-15 (September 1, 1967)

A New Orleans seafood company is the first in the industry to use commercially a new nitrogen spray freezing machine. The nitrogen freezer has reduced to a few minutes the time required to freeze cooked shrimp; the quick freezing does not appreciably affect the texture of the shrimp. To date, the management of the seafood company has only praise for the new freezing machine.

Most food items lose a certain amount of their texture and taste after being frozen, and this is directly related to the size of the ice crystals formed during freezing. The size of the individual crystals formed is related to the speed with which the product is frozen. The bigger the crystal, the greater the effect on the cell structure. With the nitrogen freezer, the process that changes a just-cooked shrimp to a solidly frozen shrimp occurs so rapidly that only minute crystals form. The result is that practically no change in the texture of the shrimp is caused by quick nitrogen freezing.

About 6,000 pounds of fresh raw shrimp arrive at the plant by truck each hour. The shrimp are packed in ice until processing begins and the shrimp are shoveled onto a conveyor. The ice is removed, and the shrimp are culled and weighed on the conveyor in a matter of minutes. Next the shrimp are conveyed to

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 ABSTRACTER: M. F. Tripple

3.2382 (*) DEVELOPMENT OF FLEXIBLE CONTAINERS FOR IRRADIATED FOODS I - SCREENING OF COMMERCIALLY AVAILABLE PLASTIC LAMINATES

Killoran, John J., and Jacob D. Breyer (Container Division, U.S. Army Natick Laboratories, Natick, Massachusetts), and E. Wierbicki (Food Division, U.S. Army Natick Laboratories, Natick, Massachusetts)
Food Technology 21, No. 8, 73-77 (August 1967)

The main object was to develop flexible lightweight containers that would be capable of withstanding rough handling and storage and would retain protective qualities after storage without having any adverse effects on the contained food. Flexible laminate containers with aluminum foil as an oxygen barrier showed promise of fulfilling these severe requirements. In support of the research on the development of flexible containers, a food-pack study was conducted by subjecting five commercially available plastic laminates to in-package radiation-sterilization processing of bacon, ham, and pork. The food-contacting films of the packaging materials were medium density polyethylene, high-density polyethylene, and polyvinyl chloride. All the food samples were packed under vacuum. The control samples were nonirradiated meat products packaged in flexible pouches and stored at -29° C. The test samples were meat products packaged in flexible pouches, irradiated at 4.5 to 5.6 Mrad with Cobalt-60 radiation, and stored at 23° C. and 50 percent relative humidity for a 12-month period.

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 ABSTRACTER: M. F. Tripple

3.2381 ACETYLATED MONOGLYCERIDES AS COATINGS FOR SELECTED FOODS

Luce, Gerald T. (Technological Products Development Department of Distillation Products Industries, Division of Eastman Kodak Co., Rochester, New York 14603)
Food Technology 21, No. 11, 48-49, 52, 54 (November 1967)

Acetylated monoglycerides prepared from fully hydrogenated sources are both highly flexible and nongreasy at the same temperature. This unusual combination of characteristics for a fatty material suggested a possible use as food coatings. Acetylated monoglycerides have been approved for use in or on foods at levels not in excess of those reasonably required to produce their intended effect in food, in food-storage equipment, or in food processing and packing. Various methods are suitable for applying coatings of acetylated monoglycerides to foodstuffs. These methods and the resultant coatings are discussed in this article, as is a brief review of the preparation and properties of acetylated monoglycerides.

There are four methods practical for application of distilled acetylated monoglyceride coatings--the dip, curtain, spray, and panning methods. The type of method to be used depends upon the desired effect and the material to be coated. In the dip-coating method, foodstuffs such as seafoods are completely submerged in a coating bath. The food is passed through a dip tank while riding on a flex-grid belt, hanging from hooks, or being otherwise conveyed. In this manner, the coating comes in contact with all surface areas. The surplus coating drains off and leaves a skintight film conforming to the shape of the object.

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 ABSTRACTER: M. F. Tripple

3.239 (*) EFFECTS OF ULTRA-RAPID FREEZING ON THE MUSCLE OF COD

Love, R. M. (Torry Research Station, Aberdeen, Scotland)
Chemistry and Industry No. 51, 2151 (December 23, 1967)

Cooling cod muscle to the temperature of liquid air causes some toughening of the flesh after cooking, and this toughening has been attributed to the irreversible loosening of protein-bound water with consequent damage to the protein (Love and Elerian, 1963; and Love, 1967). The author does not question this concept; rather he reports on the effect of extremely rapid freezing on cod muscle.

Preliminary work showed that at the most rapid freezing rate attainable there was considerable protein damage as compared with controls cooled more slowly to the same final temperature. The extractability of the myofibrillar protein in 5 percent (weight per volume) sodium chloride was the criterion of the damage, and a low value for extractability indicated undesirable change.

A high rate of freezing was obtained by spreading a layer of muscle one cell thick on a microscope cover slip and dropping the cover slip into liquid propane at -195° C. The frozen sample was then placed in 5 percent sodium chloride at 0° C. and homogenized immediately, glass and all, before any thawing occurred. It was the intention of the author to prevent changes in hydration during the thawing of a sample with such a large surface-to-volume ratio. Electron photomicrographs showed that freezing in this manner caused minute ice crystals to form

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 ABSTRACTER: M. F. Tripple

3.2381

Halibut, salmon, swordfish, or other fish steaks are best coated after they are cut from the frozen round fish. The frozen steaks are dipped for 2-5 sec. in coatings heated to 130° C. The effects of coatings on halibut steaks and whole mullet were examined under these conditions. In both cases, the coated samples retained a good appearance for 25 weeks of frozen storage in an unwrapped condition. Control samples were discolored, particularly where the fatty layers had oxidized and the controls were seriously freezer burned.

The uncoated halibut steaks lost over 16 times as much weight after 25 weeks of storage as did the coated steaks. The uncoated whole mullet lost over 7 times as much weight as did the coated mullet.

Freshly cooked whole lobster can be effectively coated after it has cooled. The most attractive coatings, and those that give good protection, are applied by dipping lobster cooled to 25°-30° C. for 1 to 2 sec. in a bath at 100°-105° C. The level of coating is less than 5 percent.

Boiled lobsters were cooled at 27°, 7°, or -18° C. prior to coating and storage. The uncoated lobsters used as controls lost 2.5 to 5 times as much weight during the freezing operation as did the coated samples. During 12 weeks of storage, the controls had 3 to 4 times as much moisture loss as did the coated samples. After 12 weeks of storage, some of the frozen lobsters were placed in boiling water for about 12 min. until the internal tail meat temperature was 82°-85° C. When sampled, meat from the uncoated controls was shriveled, darker in color because of concentrated pigments, and strongly flavored. The meat from the coated lobsters was plump, with good appearance and natural flavor. [15 references]

3.2342

A peeling machine where the heads and skin are removed. Deveining machines are used if the back veins are to be removed. The cleaned shrimp are placed in a cooker; after cooking, they are machine graded for size and any broken shrimp are removed.

At this point, most shrimp-packer producers would put the cooked shrimp in bags or cases, place them on pallets, and put them in a freezer for 24 hr. at -24° F. The result would be a bag or case of shrimp frozen together in one large lump of ice. With the nitrogen freezer, however, the cooked shrimp are placed on a conveyor belt that runs through the freezer. About 3½ min. is necessary to freeze the shrimp individually, which then exit from the freezer. This individual freezing is an asset because customers can take only as much shrimp as needed, and they do not have to thaw out an entire parcel.

The freezer capacity of 2,000 lbs. of shrimp per hour fits in perfectly with the overall handling capacity of the plant. The 6,000 lbs. of raw shrimp received each hour represents about 3,000 lbs. of cleaned shrimp and about 2,000 lbs. of cooked shrimp.

An 8,500-gallon liquid nitrogen storage tank is connected to the freezer. The freezing procedure is relatively simple--the liquid nitrogen boils at -325° F., and it is the spray of boiling inert nitrogen gas that does the freezing. The 8,500 gal. of nitrogen permits 24 hr. of operation; the tank is refilled when it is down to 2,000 gal.

3.239

between some of the muscle filaments. These ice crystals caused distortion, which may explain why the extractability fell to 65-70 percent in the test muscle as compared to over 80 percent for the control muscle. The controls were larger pieces of cod muscle cooled in several stages to -195° C.

The results were quite different when the ultra rapidly frozen sample was quickly thawed at 0° C. and then scraped off the glass cover slip into the homogenizer.

Two groups of four samples of cod muscle were frozen by the rapid method at -195° C. One group was dropped into the salt solution while still frozen and was homogenized along with the glass. The other group was thawed, scraped off the cover slip, and homogenized. The protein extractabilities of the muscle without glass were 79 percent; extractabilities with glass were 59 percent. The author interpreted this as showing that the protein had been appreciably damaged by the presence of glass. There was no measurable pH difference in the homogenate made with or without glass, so the difference was most likely the result of grinding with the glass fragments. It has already been shown that fish muscle is toughened by grinding or rough handling (Miyake and Hayashi, 1958; and King, 1962).

As far as protein damage is concerned, rapid freezing does not appear to damage cod muscles any more than slow freezing does.

3.239 FREEZE-DRIED FISH. IV - EFFECT OF SUPER-RAPID FREEZING ON THE RECONSTITUTION OF FREEZE-DRIED FISH

Uoeka, Yasunobu, Hiroyasu Oka, and Hidemichi Sumitsu (Ehime Collective Chem. Eng. Guiding Sta., Matsuyama, Japan)

Chemical Abstracts 64, 20524h (June 20, 1966)

3.2382 (Cross Reference: 3.2383)

The evaluation phase of the investigation included observations for odor, leakage, color changes, and determination of the physical changes in the flexible pouches, such as heat-seal strength, burst strength, and bond strength. Each meat product was tested organoleptically and chemically. At the end of 6 months of storage, four of the flexible packaging materials were removed from the study because of off-odors or off-colors that developed in the packaged meat products. Swelling of these pouches was not observed; however, pinholes, delamination, and loss of vacuum were seen in the defective pouches.

One laminate, which used medium density polyethylene as the food-contacting material, was found to be satisfactory for packaging ham, bacon, and pork and for storage of the products over a 1-year period. Changes in the physical properties of the pouches did not affect their functional performance. Preference scores obtained from the organoleptic evaluation indicated that the products were acceptable. Time of storage had no pronounced effect on the organoleptic acceptability. [12 references]

3.2382 A NEW TOOL FOR MEASURING THE GAS PERMEABILITY OF PACKAGING FILMS

Mohler, H., and G. H. Lyssy

Ernährungsforschung 11, No. 3, 453-464 (1966)

Food Science Abstracts 1, No. 3, Abstract 67/313, p. 109 (March 1967)

Methods currently in use for determining the gas and vapor permeability of packaging films are reviewed. A new process, which has been developed from these, is considered and a diagram of the apparatus is given.

3.4 SMOKE CURING OF FISH

Gilberg, Y. C. (Department of Food Technology, Massey University, Manawatu, N.Z.)
Commercial Fishing 6, No. 9, 13, 15, 17 (September 1967)

The modern requirements for an ideal smoking procedure are that the smoke does not contain substances detrimental to health, the smoke composition is uniform, and the process is adaptable to continuous operation.

It is the decomposition-oxidation process of wood particles that produces smoke. When wood burns at temperatures in excess of 600° F., detrimental substances may be formed in the smoke; none of these substances are formed when the burning temperature is kept below 425° F. The smoke contains both vapor and tarry droplets; the droplets give the smoke its visible character. When the vapor is absorbed, smoke is deposited on the surface of the fish. The moister is the fish and the faster the smoke flows over the surface, the quicker the chemicals from the vapor are absorbed. The vapor also contains chemicals that are responsible for reducing bacterial activity and are probably involved in formation of color.

The industrial smoking processes are either classified as cold smoking or hot smoking. Cold smoking is used to a large extent in New Zealand; hot smoking is used in many of the European countries. Differences between the two processes are characterized by the temperature during smoking, the duration of smoking, and the presence or absence of drying.

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 ABSTRACTER: M. F. Tripple

6.10 SALMONELLA ORGANISMS IN FISH MEAL

(*)
Anonymous
Fish Technology Newsletter, CIFT 4, No. 4 (January 1964) (Ernakulam)
Indian Fisheries Bulletin 11, No. 2, 24-25 (April 1964)

At one time, India exported nearly 6,000 tons of fish meal a year. Now the export has dwindled, largely because importing countries are insisting on a meal of better quality and lower cost than India produced. To discover the cause of and the remedy for the poor showing made by Indian fishmeal products in the world market, the Central Institute of Fisheries Technology examined ways of turning out a cheaper, Salmonella-free product.

Since Salmonella organisms are, in general, heat sensitive, the C.I.F.T. inoculated presscake with known numbers of the organisms and subjected the inoculated material to a range of temperatures (from 110° to 40° C.) for varying amounts of time. When the temperature was as high as 50° C., all the Salmonella organisms were destroyed; when it was in the range produced by sun drying (40° to 45° C.), some of the organisms survived.

The raw material for India's fishmeal plants comes largely from miscellaneous fish that are landed in small quantities all along the coast. The fish are often sun dried in dirty beach surroundings, a process that encourages the presence of Salmonella in the raw material. Therefore a process was developed whereby Salmonella-free fish meal made from sun-dried fish could be produced in India's most

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 ABSTRACTER: L. Baldwin

4.21 OXIDATIVE CHANGES ARE BEING INVESTIGATED AT NEW FOOD SCIENCE PIONEER RESEARCH LABORATORY

Stansby, Maurice E. (Food Science Pioneer Research Laboratory, Bureau of Commercial Fisheries, Seattle, Washington 98102)
Commercial Fisheries Review 29, No. 10, 41 (October 1967)

The Food Science Pioneer Research Laboratory of the Bureau of Commercial Fisheries, Seattle, Washington, is conducting research in the field of oxidative changes in fishery products. Although bacterial spoilage is still the chief cause of the deterioration of fish, advances in refrigeration and the development of preservation techniques, such as irradiation pasteurization, give promise that bacterial spoilage will soon become a minor problem for the fishing industry. However, these advances in the technology of fish preservation greatly increase the damage caused by oxidation. Both frozen and irradiation preservation increase, rather than decrease, the tendency for fish oils to oxidize.

The development of antioxidants that are useful for other foods has not solved this problem for fishery products because the chemical components in fish are less stable. Oxidation leads to loss of the original flavors and leaves the fish almost tasteless; it also adversely affects the texture. Prolonged oxidation can result in the development of unpleasant rancid flavors and in discoloration. Many oxidation problems occur in the utilization of the oils after extraction from the fish.

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 ABSTRACTER: M. F. Tripple

6.138 A NEW PROCESS FOR THE SIMULTANEOUS REFINING AND DEODORISATION OF FATS AND OILS

Martinenghi, G. B. (University of Milan, Italy)
Chemistry and Industry No. 43, 1815-1820 (October 28, 1967)

The refining of fats and oils by a new Italian process is accomplished more by vacuum than by stripping steam so that the steam requirements are reduced to 1 percent by weight or less of the treated fat or oil. Vacuum below 0.8 mm. is attained with pumps assisted by a freezing trap that blocks all volatile condensable vapors.

The highlights of the new process are as follows. Fatty acids and volatile bodies are simultaneously stripped of the oil with steam under residual pressure ranging from 0.4 to 0.8 mm. Hg. A new system, based on a vacuum pump and freezing condenser, is used to maintain the required vacuum and to condense the steam and volatile bodies from the odor portion. No steam jets, boosters, or barometric condensers are necessary, which means that only a small quantity of cooling water is required. The risk of oxidation and polymerization is eliminated by the complete deaeration of the fats and oils entering the process and deaeration of the water used to generate the stripping steam.

The main advantages of the process are it provides for simultaneous and efficient refining and deodorization; it yields distilled fatty acids as a byproduct

(over)

 ABSTRACTER: M. F. Tripple

METHODS OF SMOKING FISH

OXIDATIVE CHANGES IN FISHERY PRODUCTS

MODERNIZING INDIA'S FISHMEAL INDUSTRY

REFINING AND DEODORIZING FATS AND OILS

4.21 (Cross Reference 7.87)

The Food Science Pioneer Research Laboratory is undertaking projects that will provide basic knowledge about the manner in which fish oils oxidize and the way these reactions can be controlled. The initial research is being carried out on menhaden and silver salmon. Menhaden represents the largest source of commercial fish oil in this country; silver salmon represents a typical species that has severe oxidation problems when the fish is used for human food.

The research program is being carried out along the following lines:

I - A study of what oxidation problems exist during the commercial handling of fish, with flavor and odor changes receiving particular attention.

II. A study of the mechanism of oxidation of fish.

III. A study to determine what role bacteria play in the oxidation of fish oils when bacterial spoilage occurs simultaneously with oxidation of oils.

IV. A study of antioxidants that are to be used with fish oil, both before and after extraction of the oil from the fish.

V. An investigation of the mechanism of oxidation that occurs in fish oils incorporated into paint. When paint containing fish oil dries, an undesirable change takes place as a result of oxidation, and a fishy odor simultaneously develops. An investigation of this phenomenon is aimed at controlling the formation of odor while allowing the desirable drying of the paint to take place.

VI. In addition to the research on oxidative deterioration, the Laboratory is about to begin an investigation dealing with certain aspects of the biochemistry of living fish.

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with a fatty acid factor of generally not higher than 1.1, which represents considerably lower losses than in alkali refining; and it uses substantially less steam than other systems do. [11 references]

1. Oil feed pump
2. Oil heat exchanger
3. Oil deaerator
4. Deaerated oil feed pump
5. Heat exchanger
6. Refined oil cooler
7. Refined oil receiver
8. Refined oil discharge pump
9. Cold steam generator
9a. Steam superheater
10. Refining still
11. Fatty acids condenser
12. Fatty acids receiver
13. Distilled fatty acids discharge pump
14. Trap
15. Low temperature surface condenser
16. Vacuum pump
17. Refrigerating unit
18. Steam boiler

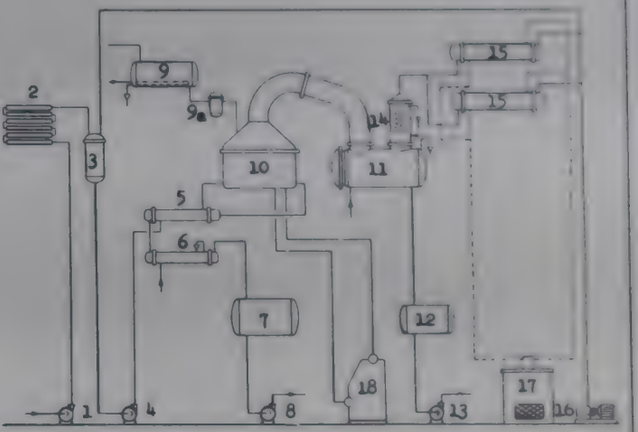

Diagram of industrial plant using new refining process

3.4

In cold smoking, the smoke is applied to the fish at a low temperature in the range of 77°-86° F., and the fish remains uncooked. If the temperature rises above 86° F., the surface of the fish looks wrinkled and dry, and the flesh tends to break apart. Little or no drying occurs if the relative humidity in the smokehouse is above 75° F. The more moisture removed from the product, the greater the keeping quality; however, the consistency becomes less desirable. The critical moisture content to restrict bacterial growth is from 20-30 percent; to restrict mold, the moisture content must be lower. Important changes occur in the fish during the salting and drying steps, as the low salt content of the cold-smoked products is not sufficient to have any preservative action. The effects of the salt are to sensitize the bacteria to the action of the antiseptics in the smoke and to give the fish a desirable glossy appearance.

Hot smoking requires that the temperature be above 90° F., whereby the fish is flash cooked. Hot-smoked products have a longer shelf life than cold-smoked products because the temperature of the smoke kills most of the organisms present in the fish. Several highly priced fish delicacies, such as sprats, sardines, and eels, are produced in Europe by hot smoking. The hot-smoking procedure, as used in Europe, is outlined. The yield of smoked product is about 60 percent of the live weight.

The following types of smoking equipment are described: traditional smoke house or kiln, smoke generators of the friction type, Torry-type kilns, and smoke extracts.

6.10 (Cross Reference: 1.01512)

up-to-date fishmeal plant, the one at Bombay. However, this product did not meet the nutritional standards prescribed for fish meal made from fresh fish.

Although the meal produced in the Bombay plant was free of Salmonella, the plant could turn out an economical product only in 1-ton units. To meet the standards of quality without losing the advantages derived from using the readily available small-lot fish, C.I.F.T. designed a drum dryer that could produce fish meal on a smaller scale. This dryer can treat fresh fish in ½-ton units at sufficiently high temperatures to ensure a Salmonella-free product.

(Abstract of this article appears under 1.01512 page 1 - February 1967)

Ibrahim, K. H., et al.
Indian Journal of Fisheries 9, Section A, No. 2, pp. 433-869; Section B, No. 2, pp. 91-161 (October 1962)

FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

6.190 LAYING RATIONS BASED ON WHEAT, OATS, AND FISH MEAL

Smith, R. E. (The Quaker Oats Company, Barrington, Illinois), and H. W. R. Chancey (Experimental Farm, St. John's West, Newfoundland)
Poultry Science 46, No. 6, 1438-1442 (November 1967)

Two experiments were conducted to determine the nutritive value and costs of laying rations based on wheat, oats, and fish meal. The first experiment was designed to study the value of adding commercially prepared white fish meal at levels ranging from 4.5 to 22.0 percent to an all wheat diet. The authors postulated that a combination of grains might provide a better amino-acid pattern and so require less protein supplement than a diet based on a single grain. Therefore, a second experiment was conducted to determine the minimum amounts of fish meal required to supplement diets based on wheat or on a wheat-and-oats mixture.

Experiment I.--The ratio of fish meal to wheat in Diet 1 was 5:95, and the ratio was progressively increased until it reached 25:75 in Diet 5. The control diet contained corn and soybean meal in a ratio of 75:25. Each of the diets was tested for response when supplemented with 0.1 percent DL-methionine and 0.1 percent L-lysine HCl. The 12 dietary treatments were fed to 24 groups of White Leghorn pullets on an ad libitum basis.

The experimental dieta caused no differences in egg production, which indicated that about 5 percent fish meal adequately supplemented the wheat and that
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6.30 SEAWEED EXTRACTS AND THEIR USES

Aberdein, Cyril (International Seaweed Exchange, London, S.E.1, England)
American Perfumer and Cosmetics 82, No. 8, 45-46 (August 1967) (1031 South Boulevard, Oak Park, Illinois 60302)

The accompanying table provides information about the uses of seaweed extracts. The original, unabridged table was prepared by the International Seaweed Exchange from data supplied by its members. It also contains product names and name and address of the manufacturer.

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6.199 THE EFFECT OF FISH MEAL SUPPLEMENTATION OF CHICKEN BREEDER RATIONS ON HATCHABILITY

March, B. E., and Jacob Biely (University of British Columbia, Department of Poultry Science, Vancouver, British Columbia, Canada)
Poultry Science 46, No. 6, 1532-1536 (November 1967)

Fish meals manufactured from whole fish are generally considered desirable supplements to breeder rations. There are, however, reports indicating that fish meal may have an adverse effect on the hatchability of hens' eggs. There is scant information available on whether fish meals in general depress hatchability when fed at high levels, or whether the effect is confined to certain types of meal. The following experiments were conducted over a 3-year period to compare the effects on hatchability of breeder diets supplemented with soybean meal, British Columbia herring meal, and Atlantic Coast white fish meal.

Experiment I.--The three basic diets were supplemented with either 14.5 percent soybean meal, 10.0 percent herring meal, or 10.0 percent white fish meal as sources of supplementary protein. The diets with white fish meal were made isonitrogenous by the addition of soybean meal in varying percentages. Each diet was fed with and without supplementary folacin to determine whether a folacin deficiency might have been responsible for the adverse results reported with fish meal in breeder rations.

Experiments II and III.--Diets similar to those in Experiment I were used except that 2.5 percent dehydrated cereal grass was added to the basic diets to form
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5.32 (*) PRODUCTION OF DIMETHYL SULFIDE FROM UNICELLULAR ALGAE

Ishida, Yūzaburō, and Hajime Kadota (Research Institute for Food Science, Kyoto University, Kyoto, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 8, 782-787 (August 1967)

Haas (1935) and Challenger and Simpson (1948) reported that the main component of the volatile compounds giving multicellular marine algae their unique smell was dimethyl sulfide. Motohiro (1962), Ronald and Thomson (1964), Sipos and Ackman (1964), and Ackman et al. (1966) added that, through ingestion of the algae, the dimethyl sulfide and its related compounds may be the cause of the odor of some marine fishes and mollusks. The present report concerns identification of volatile sulfur compounds that are evolved by unicellular algae during their growth.

The volatile sulfur compounds evolved during growth by various unicellular algae were fractionated into thioether, mercaptan, and hydrogen sulfide. Thioether was found to be the major compound of the sulfur compounds in Gyrodinium cohnii (a heterotrophic, marine dinoflagellate). Mercaptan was the major component in Astasia longa (heterotrophic, fresh water) and Euglena gracilis (photoautotrophic, fresh water). Hydrogen sulfide was the major component produced in
(over)

*Item on back of card.

NUTRITIVE VALUE OF FISHMEAL-BASED LAYING RATIONS

EFFECT OF FISH MEAL ON EGG HATCHABILITY

USES OF SEAWEED EXTRACTS

PRODUCTION OF DIMETHYL SULFIDE BY UNICELLULAR ALGAE

6.199

additional diets. Each diet was fed to lots of White Leghorn pullets. Hatchability was determined on settings of eggs, and all eggs that did not hatch were examined.

Hatchability was 84, 88, and 90 percent, respectively, for each of the three experiments. Most of the embryonic deaths occurred during the last week of incubation and at hatching, or during early incubation stages. The values of hatchability from the three experiments were analyzed statistically to determine if there were differences in performance depending on the source of supplementary protein. The average values of hatchability obtained in the six balanced comparisons were 87.4, 88.3, and 85.7 percent, respectively, for soybean, herring, and white fish meals. On the basis of a multiple range test, the hatchability of eggs from diets supplemented with white fish meal were significantly lower than the hatchability of eggs from diets supplemented with either herring meal or soybean meal. Although analysis of the average values in the three experiments indicated lower overall hatachability of eggs from birds fed the white fish meal, separate examinations of data from each experiment showed a significant effect of white fish meal only in Experiment II.

There was no consistent response in hatchability with folacin supplementation of the diets except in Experiment I, where the difference in hatchability was evidently not due to differences in the folacin content of the diet. Supplementing diets with dehydrated cereal grass did not consistently affect hatchability.

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levels of fish meal up to 22 percent of the diet were not harmful. Egg weight was higher in the control diet than in the wheat and fishmeal diets. Egg quality and body weight gains did not differ significantly between the experimental diets. Supplementing the diets with methionine and lysine did not affect performance; however, body weight gain was significantly lower when these amino acids were added. There were no differences between diets with respect to feed intake although consumption was high on all diets. No complaints of fishy flavors were registered by persons regularly consuming the eggs.

Experiment II.--Diets based on wheat or a wheat-and-oats mixture were fed without protein supplementation and with 2 and 5 percent added fish meal. Each of 6 diets was fed to 4 pens of 50 birds. Procedures were similar to those in Experiment I. The birds on the wheat diet produced fewer eggs than birds did on the wheat-and-oats mixture. Adding fish meal to the wheat diet produced a significant increase in egg production. There was no increase in egg production when more than 2 percent fishmeal level was added to the wheat-and-oats diet. Egg weight was significantly higher on the wheat-and-oats diets than on the wheat diet alone. Egg weight improved on both basal diets when 2 percent fish meal was added, but there was no significant response to a further addition of 5 percent fish meal to the wheat-and-oats diet. Egg quality appeared to be inversely related to egg weight in that Haugh units decreased with an increasing level of fish meal in both basal diets. Body weight gain tended to increase with increasing levels of fish meal in both wheat and wheat-and-oats diets.

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Amphidinium carterii, Glenodinium sp., Chlamydomonas sp., and Nanochloris oculata (all four photoautotrophic fresh water); in Haematococcus pluvialis and Polytoma uvella (both heterotrophic fresh water); and in Chlamydomonas komma, Scenedesmus obliquus, Chlorella vulgaris, and C. pyrenoidosa (all four photoautotrophic fresh water). The thioether fraction was composed principally of dimethyl sulfide.

Apparently the ability of unicellular algae to produce thioether, mercaptan, or hydrogen sulfide is related to the metabolic type and the natural environment of the algae. [22 references]

The difficulty of splitting off the phycobilin prosthetic groups of the algal biliproteins (phycoerythrins and phycocyanins) and isolating them in quantities high enough to permit classical degradation and analysis has hampered investigations of these prosthetic groups. By using the chromic acid microdegradation technique refined by Rüdiger (1967) for his studies of aplysioviolin (the defense pigment of the sea hare), the present authors have overcome the difficulty. With this technique, which may be used with as little as 100 µg. of bilin and is unaffected by the presence of protein, they were able to degrade phycobilins that were still attached to the protein. As a result, they have identified side-chain groupings previously undetected. Their methods and findings are discussed. [7 references]

Rüdiger, Wolfhart (Institut für Biochemie der Universität des Saarlandes, Saarbrücken, Germany), Pádraig O Carra, and Colm O hEocha (Biochemistry Department, University College, Galway, Ireland)
Nature 215, No. 5109, 1477-1478 (September 30, 1967)

6.32 STRUCTURE OF PHYCOERYTHROBILIN AND PHYCOCYANOBILIN

6.30

Products containing seaweed extracts

Product components	Cosmetic creams and lotions	Dental impression materials	Dietetic foods	Emulsions suspensions	Jellies, medical lubricants	Tablet binders	Tablet disintegrants	Microbiological media	Ointments	Liquid shampoos	Toothpastes	Shaving creams	Wave sets
Agar		+	+		+	+	+						
Agar-agar		+	+	+	+		+	+	+		+		
Agaran		+	+	+	+	+	+	+	+		+		
Alginate		+									+		
Alginic acid							+						
Sodium alginic acid				+			+						
Sodium alginate	+	+	+	+	+	+			+	+	+	+	+
Propylene glycol alginate			+	+						+	+		
Potassium alginate		+	+										
Carrageenan	+		+	+	+	+			+	+	+	+	+

6.54 DEVELOPMENT, USE OF FISH PROTEIN CONCENTRATE DISCUSSED
(*)
Anonymous
Feedstuffs 40, No. 4, 48 (January 27, 1968)

The role of fisheries in supplying needed protein, particularly by developing a fish protein concentrate (FPC) industry, was discussed by United Nations food specialists at a conference on FPC held in Canada. The role of fisheries in plans for battling malnutrition was defined in papers presented by representatives of the fisheries department of the Food and Agriculture Organization of the U.N. One author said that, while it is recognized that the greatest potential markets for FPC are in the developing countries, much of the impetus for developmental work on FPC comes from the interests of industries in developed countries. The fishing industries are concerned about the waning demand for fish, while food processors want protein-rich, inexpensive ingredients for the manufacture of a large variety of food products.

FPC can be introduced into developing countries by foreign aid, by foreign commercial sources, or by domestic producers producing with or without government subsidies. This author says, however, that feasibility studies must be carried out in the countries to be assisted, and it must be guaranteed that the food supplies are used in the most advantageous manner. Many persons in FPC development are skeptical that there will be sizable commercial markets in developing countries in the immediate future.

*Item on back of card. (over)

6.54 THE FISH PROTEIN CONCENTRATE STORY
4. WORLD EFFORTS TOWARD FPC

Knobl, George M., Jr. (Bureau of Commercial Fisheries Technological Laboratory, College Park, Maryland 20740)
Food Technology 21, No. 8, 56-59 (August 1967)

The various methods for producing fish protein concentrate (FPC) may be divided into three categories: chemical, biological, and physical. Chemical methods use solvent extraction to remove the water and lipids from raw fish and result in bland-tasting, light-colored protein powders. Chemical methods are used mostly in the Western Hemisphere. Biological, or fermentation and enzymatic, methods are the oldest methods for producing FPC and are important in the Far East for the production of flavorful fish sauces and pastes. Physical methods are those that use a variety of nonchemical means, such as currents at high voltage, to assist in the separation of components in the fish tissue.

This second part of the FPC story is a survey of the many efforts made to apply the three methods to fish processing. The names of organizations or persons responsible for the development of the various methods, and the resulting products are listed on an international basis.

A solvent useful for extraction of fishmeal or raw fish should be nontoxic; available in pure form; easy and safe to handle; inexpensive; efficient in removal (over)

6.54 VOLATILE CONSTITUENTS OF FISH PROTEIN CONCENTRATE

Wick, Emily L., Edward Underriner, and Evan Paneras (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Massachusetts)
Journal of Food Science 32, No. 4, 365-370 (July-August 1967)

Fish protein concentrate (FPC) can be tasteless, but some FPC samples can be given a fishy taste simply by the addition of water. Since such a flavor could prevent maximum use of FPC in many food products, the authors attempted to identify the volatile constituents of FPC. Such an identification could lead to an understanding of the mechanism and formative conditions of the flavor.

Two samples of FPC prepared from red hake (Urophycis chuss) were used in the study. One sample had been prepared with fresh, pure isopropanol only; the other, with a mixture of fresh and recycled isopropanol that had been purified by distillation. A schematic outline of the process used to separate the volatile constituents appears on the back of the card.

The amount of amine mixture isolated was governed by the processing condition; it was directly related to the flavor intensity of the FPC. Thin-layer and gas chromatographic separation and mass spectrometric analysis of the amines revealed that the components of the flavor were dimethylamine, trimethylamine, ammonia, ethylamine, diethylamine, n-propylamine, and a butylamine. Methylethylamine, isopropylamine, and methylamine were tentatively identified also. (over)

6.54 NATURE OF THE RESIDUAL LIPIDS IN FISH PROTEIN CONCENTRATE (FPC)

Medwadowski, B. F., J. Van Der Veen, and H. S. Olcott (Institute of Marine Resources, Department of Nutritional Sciences, University of California, Berkeley 94720)
Journal of Food Science 32, No. 4, 361-365 (July-August 1967)

The work reported here covers studies of the amounts and kinds of lipids remaining in fish protein concentrate (FPC) made by isopropanol extraction and by ethylene dichloride extraction. The samples of isopropanol-extracted FPC were prepared from fresh-frozen whole red hake (Urophycis chuss) that had been ground, extracted several times with hot isopropanol, desolventized under vacuum at temperatures of not more than 65° C., and stored in Mylar bags inside closed metal cans. The ethylene-dichloride-extracted samples were made from a mixture of fish (predominately hake, but with some skate and monkfish included) that had been ground, extracted azeotropically with hot ethylene dichloride, dried, washed with methanol, redried, and stored in plastic bags.

Residual lipids were extracted continuously with chloroform/methanol (2:1) until extraction was essentially complete. The chloroform-soluble residues--that is, the lipid materials--were fractionated on two columns by column chromatography, and the fractions were analyzed for phosphorus, sterols, and reducing sugars; the lecithin and sphingomyelin fractions were examined by spectrophotometer. Fractions from the two columns were identified by thin-layer chromatography, one (over)

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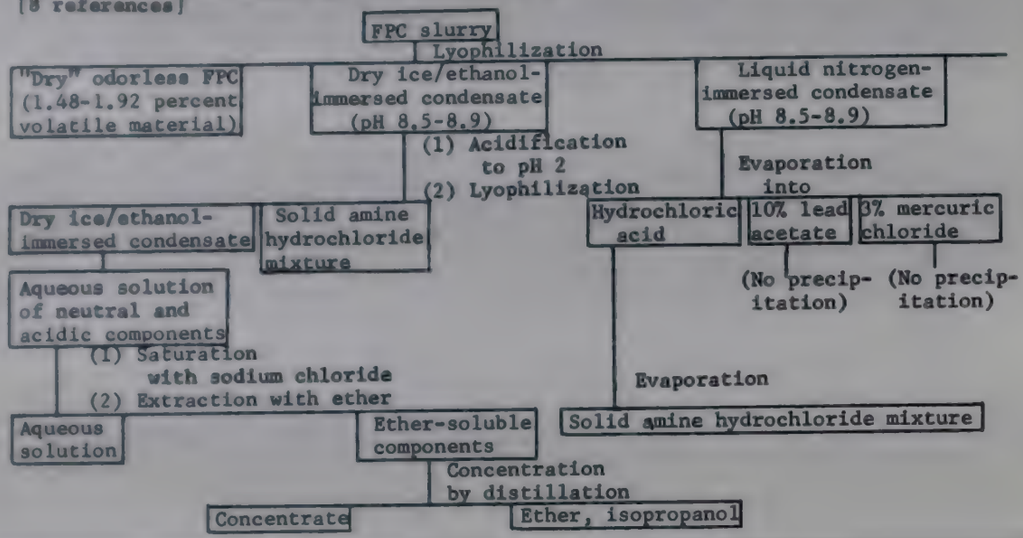
The authors conclude that, if FPC of high quality is to be produced, reclamation of isopropanol must involve more than purification by distillation; otherwise all extracted fish constituents that have boiling points lower than that of the alcohol-water azeotrope will remain in the solvent as contaminants. [8 references]



6.54

system being used to separate the simple lipids and the other to separate the polar lipids. The composition of the total fatty acids in the lipid extracts was determined by gas chromatography of the methyl esters. Some of the findings appear below. (IP = isopropanal-extracted; E-D = ethylene-dichloride-extracted)

Kind of lipid	Amount (in %) found in IP samples	E-D sample
Total residual lipids	0.10-0.19	0.51
Recovery by column fractionation of lipid extract	88.3-99.2	94.3
acidic lipids	5.4-11.2	12.8
phosphatidyl ethanolamine and like ionic lipids	9.3-12.6	8.2
nonacidic lipids (except phosphatidyl ethanolamine)	68.9-70.5	70.3
Total recovery by rechromatography of nonacidic lipids	88.7-94.9	84.4
triglycerides, sterols	39.7-50.8	31.8
mono- and diglycerides	10.0-14.4	22.9
phospholipids (mainly lecithin)	17.1-32.8	11.1
phospholipids (mainly sphingomyelin)	1.6-4.4	10.8
C-16 series of fatty acids	30-35	38
C-18 series of fatty acids	32-43	35

The saturated fatty acids were mainly palmitic and stearic; the unsaturated fatty acids, mainly oleic and palmitoleic. The low content of polyenoic fatty acids may account for the high stability of the residual lipids to oxidation. The overall conclusion is that half or more of the small amounts of lipid left in FPC by both extraction methods are neutral lipids. [14 references]

6.54

The author of one of the papers cited the following statements by a South African scientist: "South Africa has produced and used about 2,000 tons of fish flour for human consumption, and it is the only country in the world to have produced and used more than 1,000 tons of fish flour for human consumption. South Africa is the only country to have actually sold fish flour on the open commercial market. However, it seems very doubtful that there will be sufficient demand for this product in the economic sphere. FPC can be used to feed the most needy malnourished babies and children of underprivileged parents only by government subsidization or by charitable organizations, or by the industries that employ these people."

The Assistant Chairman of the Fisheries Research Board of Canada discussed the potential utilization of fish resources for FPC production, and he stated that availability of raw material will not be a limiting factor in the development of an FPC industry in Canada. The world catch of aquatic products doubled during the last 10 years to a current annual yield of more the 50 million metric tons. It is predicted that landings can double again by the end of the century. An aggressive fisheries development program should allow Canada to double its present level of annual production, which is about 1 million tons, within the same period.

(Abstract of this article appears under 6.130 page 13 - February 1968)

Swendsen, David L.
Chemical Engineering 74, No. 8, 176-178 (April 10, 1967)

6.54 NEW SOLVENT EXTRACTION PROCESS REAPS PROTEIN FROM FISH

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of water, lipids, and odor-bearing compounds without dissolving or reacting with proteinaceous components; of low boiling point; suitable for solvent recovery and easy deodorization; and inert toward equipment materials. At the present time, there is no single solvent or group of solvents available that can meet all these requirements.

The biological methods in general result in a mixture of protein breakdown products, which facilitates separation of water and lipids by simple physical means. By producing soluble protein cleavage products, biological methods result in flavorful products. Vast quantities of pastes and sauces are manufactured by the biological process; however, these products often are expensive, are produced under primitive conditions, are low in nutritive quality, and have a high salt content. An advantage is that the process can be relatively simple.

The physical methods include passage of electric discharge through a raw fish slurry to facilitate the separation of oils, water and water-soluble constituents, and solids. Another physical method is designed to remove moisture from fish. The raw fish is finely divided and then dispersed in a nonvolatile liquid, preferably immiscible with water, that can act as a heat transfer unit. When pressure is suddenly reduced over the surface of the dispersion containing heated fish particles, the moisture is removed by flash evaporation while the dehydrated fish particles are retained in the nonvolatile heat-transfer medium. The fish particles are separated from the transfer liquid by filtration or centrifugation, and the particles can be extracted by solvent. [28 references]

6.55 PUTTING RESEARCH TO WORK

Morrison, Spencer H.
Feedstuffs 39, No. 39, 38 (September 30, 1967)

In 1965, Huber et al. reported that fish protein concentrate (FPC) had real potential as a partial replacement for the protein in milk replacers. In the same year, Slade corroborated the conclusion.

Working together, Huber and Slade have now extended the investigation. Using 108 Holstein calves of both sexes, they ran four experiments in which milk replacers were the only source of nutrients.

In Trial 1, twelve male calves were fed milk replacer as their only food from the time they were 3 days old till they were 45 days old, when they were sold. Twenty female calves were fed the same diet the same way; but between the ages of 45 days and 87 days, they were allowed to eat a commercial calf starter for up to a maximum of 4 lb. per head per day and a hay composed of alfalfa and orchard grass. In the milk replacer, FPC furnished varying amounts of the dietary protein--0, 20, 40, or 60 percent. Calves receiving milk replacer containing 0, 20 or 40 percent of FPC gained the same, but those receiving the 60 percent ration gained about 0.22 lb. per head per day less during the 3- to 45-day period. After that time, the heifers' gains were all alike regardless of their previous rations.

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 ABSTRACTER: L. Baldwin

7.42 SOLVENT TECHNIQUES FOR THE DIRECT COLORIMETRIC DETERMINATION OF COPPER AND IRON IN OILS

Labuza, T. P., and M. K. Karel (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Massachusetts)
Journal of Food Science 32, No. 5, 572-757 (September-October 1967)

Introduction.--The standard procedure for determining trace metals in biological materials necessitates ashing the sample to obtain an aqueous solution. Once the sample is prepared, numerous methods may be used to determine the metal content. When the common ashing techniques are used with oils, serious errors result from spattering, foaming, and volatilization of the sample. Several methods have been used in the past to eliminate the ashing procedure, but large samples of 20 to 50 grams or special equipment was necessary.

Methods.--Solvent procedures, which eliminated the ashing step, were developed to allow use of the 0.5 to 2 gram oil samples when determining iron and copper. The method developed for iron was based on the aqueous 1,10-o-phenanthroline procedure (Sandell, 1950), which was modifed to use an initial solvent extraction procedure to remove the metal. The principal modification was that the sample was added to a nonaqueous phase in contact with the reagent. A short equilibration was needed to extract the iron into the reagent phase. The method developed for copper was based on the sodium-diethyldithiocarbamate technique (Sandell, 1950) for determining the metal directly in a solvent-oil mixture. The system was selected to be mutually suitable for both inorganic and organic

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 ABSTRACTER: M. F. Tripple

7.593 EDTA INHIBITION OF INOSINE MONOPHOSPHATE DEPHOSPHORYLATION IN REFRIGERATED FISHERY PRODUCTS

Groninger, H. S., and J. Spinelli (Bureau of Commercial Fisheries Technological Laboratory, Seattle, Washington 98102)
Journal of Agricultural and Food Chemistry 16, No. 1, 97-99 (January-February 1968)

The present study was designed to determine the rate of dephosphorylation of inosine monophosphate (IMP) in the muscle from a number of fish species and to evaluate the effectiveness of (ethylenedinitrilo)tetraacetic acid (EDTA) as an inhibitor of this dephosphorylation reaction in several fishery products. EDTA was added to fillets or fish pieces at a level of 0.8 µmole per gram. Treated and control samples were vacuum packed in cans and irradiated.

The rates of IMP dephosphorylation at the temperature of melting ice varied greatly among fish species. The IMP in English sole (Parophrys vetulus) and true cod (Gadus macrocephalus) was rapidly hydrolyzed; the IMP in Dover sole (Microstomus pacificus), sand sole (Psettichthys melanostictus), starry flounder (Platichthys stellatus), and Sebastodes sp. was hydrolyzed more slowly; the IMP in rock sole (Lepidopsetta bilineata), lingcod (Ophiodon elongatus) and hake (Merluccius productus) was hydrolyzed quite slowly. The fish showed rates of IMP dephosphorylation at 37° C. that were similar to the rates at melting-ice temperatures. Some activation and inhibition were shown by incubation of the mixed muscle extracts of slow and fast hydrolyzers. Because the amount of change in the rate of IMP dephosphorylation was small as compared with the differences between slow and

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 ABSTRACTER: M. F. Tripple

7.595 (*) STUDIES ON "GREEN" TUNA. IV - EFFECT OF CYSTEINE ON GREENING OF MYOGLOBIN IN THE PRESENCE OF TRIMETHYLAMINE OXIDE

Koizumi, Chiaki (Tokyo University of Fisheries, Konan-4, Minato-ku, Tokyo, Japan), and Fumio Matsuura (Lab. of Marine Biochemistry, Fac. of Agr., The University of Tokyo, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 9, 839-842 (September 1967) (In English)

When trimethylamine oxide (TMAO) is incorporated into tuna meat before the meat is cooked, the ordinary pink color takes on a tannish-green hue owing to greening of the myoglobin. Since a solution of crystalline tuna metmyoglobin and TMAO does not turn green, the authors postulated that some additional factor is required to make the myoglobin turn green. To locate this factor, they mixed solutions of metmyoglobin and TMAO with a number of reducing substances, heated the solutions, and examined the precipitates for color changes.

In the first experiment, egg albumin was used instead of tuna, since it is colorless. When the albumin was heated without TMAO, the coagulum was faintly pink; when it was heated with TMAO, it was faintly yellowish green. Although tuna myoglobin reportedly has 1 mole of cysteine in its molecule, the amount is evidently less than in the egg albumin. Yet the amount of cysteine residue was considered relevant to the greening of the tuna myoglobin in the presence of TMAO.

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 ABSTRACTER: L. Baldwin

FISH PROTEIN CONCENTRATE IN CALVES' DIETS

COLORIMETRIC DETERMINATION OF COPPER AND IRON IN OILS

INHIBITION OF DEPHOSPHORYLATION IN FISH

EFFECT OF CYSTEINE ON GREENING IN TUNA

7.42

compounds. The copper was determined directly in this single-phase system, after equilibration for color development.

Results.--When the new method was compared with the aqueous ash procedure using oils of known iron content, the results showed that the two methods were equivalent in precision. The solvent procedure for iron was capable of determining 0.1 p.p.m. of iron in the oil; the solvent procedure for copper gave similar results.

Conclusions.--The results indicate that the direct solvent extraction procedure was both reliable and rapid for determining iron in oil samples. Sample loss caused by extraction was negligible, and the precision of the method was comparable to or better than that of the ash technique. It would be expected that more sample would be lost and lower precision found in the ashing technique because of the numerous manipulations. Therefore, the developed procedure should be more reliable to use.

Similar results were obtained for the direct solvent technique for copper. One advantage of this technique was that the color did not fade as it does in the aqueous technique. The color was even stable in sunlight.

The tests indicated that a very rapid and accurate system had been developed whereby the trace metal content of oil could be determined without expensive equipment. Samples of 0.1 µg. per gram of iron or copper can be easily determined, as it is only necessary to have a concentration of at least 0.02 to 0.04 µg. per ml. in the final test solution. These tests would be useful in food and biological research because of the ease of performance and the small sample size required.

7.595

Therefore, in the second experiment, cysteine, glutathione, thioglycolic acid, hydrogen sulfide, ascorbic acid, and sodium hydrosulfite with and without TMAO were used instead of the egg albumin during anaerobic cooking.

Color tests following the heat treatment showed that glutathione, thioglycolic acid, and hydrogen sulfide with TMAO caused slight greening; cysteine with TMAO caused intense greening. The other reducing agencies induced only a brown. The authors concluded that myoglobin, cysteine, and TMAO could be used in a model system to represent natural green tuna.

7.595 DETERMINATION AND PRESISTANCE OF ETHYLENE OXIDE IN BONE, FISH, AND MEAT MEALS AFTER GASEOUS STERILIZATION

Bertoldini, G., V. Marazza, and G. Reina (Univ. Milan, Italy)
Chemical Abstracts 66, No. 25, 11463Oy (June 19, 1967)

6.55

In Trial 2, a 3^2 factorial-design experiment, 54 heifers were fed diets in which FPC furnished 0, 33, or 67 percent of the protein in the milk replacer, and 10, 15, or 20 percent (on a dry basis) of emulsified lard oil was used as the other variable. The experimenters originally intended to include a diet in which FPC furnished 100 percent of the protein, but after two calves on this diet died, the experiment was stopped. As the level of FPC was increased, the daily gains decreased, but as fat was increased, daily gains and feed efficiency were improved. The calves showed a significant linear decrease in heart girth and in the height of withers with increased FPC.

Trials 3 and 4 were balance trials. In Trial 3, six male calves 12 weeks old were fed milk replacer containing 0, 33, or 67 percent FPC. (The calf on 100 percent FPC died during the first 14-day period of the test.) In Trial 4, 16 male calves 3 days old were put on milk-replacer diets containing 0, 33, 67, or 100 percent FPC. Fecal and urine specimens were collected at 1 and 6 weeks for the first three diets, but for only 1 week for the last, since four of the calves on the 100 percent ration died. Digestibility of dry matter, crude protein, ether extract, and ash decreased as the percentage of FPC increased.

Calves on the 100 percent FPC diet ate well, showed normal growth, and appeared to be healthy for the first 3 or 4 weeks of the diet. Then they became emaciated and listless and had no appetite. If they were immediately removed from the diet and fed whole milk, they recovered. Otherwise they did not. Since autopsy revealed no sysptoms of fluorine toxicity, the examining pathologist concluded that death was primarily due to pneumonia and enteritis from secondary bacteria or viruses that had entered the calves' bodies after they were weakened by inanition or low-grade toxicity.

7.593

fast hydrolyzers, other factors were apparently more important than enzyme activators in the fast hydrolyzers and inhibitors in the slow hydrolyzers.

Almost complete inhibition of IMP dephosphorylation resulted when EDTA was added to muscle extracts at a level of 2.5 mmoles. EDTA inhibition apparently occurred quite rapidly and was apparently due to the chelation of an activator metal. If the muscle extract remained in contact with the EDTA for a sufficient period of time, IMP dephosphorylation activity was irreversibly inactivated. When EDTA was added to ground or whole muscle, the effectiveness of the treatment depended upon the rate of dephosphorylation of the species used. EDTA treatment stabilized the IMP in lingcod, Sebastodes sp., and sand sole muscle, but not in English sole and true cod muscle.

Sensory evaluation of sand sole and lingcod muscle showed highly significant differences between EDTA-treated and untreated samples. Most panel members preferred the treated samples, which preference indicates that EDTA treatment is effective in controlling some of the flavor change that normally occurs in these fish after a period of refrigerated storage.

In fresh, untreated fish muscle, the loss of IMP will continue until the enzyme is inactivated by cooking. Large losses of IMP in starry flounder and true cod during slow cooking resulted from the active phosphomonoesterase in these fish. Sand sole muscle, which has a less active phosphomonoesterase, underwent a moderate loss of IMP during slow cooking. EDTA treatment of muscle immediately prior to cooking did not prevent dephosphorylation of IMP during cooking. This result indicated that the lag time between EDTA treatment and inhibition was not significantly shortened by cooking. [14 references]

8.53 (*)

VARIACIONES ESTACIONALES EN LA COMPOSICION QUIMICA DE LA MERLUZA DEL ATLANTICO SUDOCCIDENTAL INDUSTRIALIZACION] [SEASONAL VARIATIONS IN THE CHEMICAL COMPOSITION OF THE SOUTH-WESTERN ATLANTIC HAKE - MANUFACTURING]

Chiodi, Oscar R. (Departmento de Investigaciones Pesqueras, Estación de Biología Marina y Tecnología Pesquera de Mar del Plato, Buenos Aires, Argentina)
CARPAS 3, Doc. Tec. No. 4, 34 pp. (November 1966) (Paper presented at the Third meeting of the Comisión Asesora Regional de Pesca para el Atlántico Sudo-Occidental, Montevideo, Uruguay 1966)

The hake (Merluccius merluccius Hubbsi) normally inhabits water having temperatures of from 5° to 7° C.; however, it sometimes passes over the thermocline and invades near-surface waters having temperatures of about 10° C. The most frequently observed parasites of the hake are nematodes, cestodes, and copepods. A protozoa identified as Chloromyxum Rosenbuschi Gelormini is found in the fillets.

Because of the percentage of lipids in the whole fish, the hake must be considered a semifat species. If, however, the fat in the meat is the only portion taken into consideration, then the hake would be included in the lean group of fish. The viscera of hake contains a percentage of fat higher than that found in meat alone. The liver contains the highest number of lipids; in an oily condition, it will contain 50 percent or more of the lipids. In both the male and female gonads, the highest concentrations are found during spawning periods and the lowest concentrations during periods of rest. Lipids in the adipose tissue

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 ABSTRACTER: M. F. Tripple

9.2

"OBSOLETE" FISH SUBSIDIES SHOULD BE ABOLISHED

Anonymous
Western Fisheries 75, No. 1, 41-42 (October 1967)

According to an Ottawa investment counselor, many of the Canadian government's subsidy and aid programs set up for the fishing industry should be abolished. He submits that many of these programs are obsolete activities, simply perpetuating a status quo that should not be continued. He defines an "obsolete" activity as one that (1) is aimed at alleviating a problem that no longer exists, or (2) has failed over a long period of time to produce satisfactory solutions to problems. In his definition, he includes policies whose costs clearly outweigh their benefits and whose damage to the country's productivity is more likely than is their chance of improving it.

Most of Canada's subsidies are concentrated in fishing, farming, and mining, he notes. The problems of the fisherman are comparable in many respects to those of the farmer--the small marginal operator who cannot see that he must turn increasingly to large-scale techniques if he is to survive. Ocean fishing, particularly on the Atlantic coast, is still largely done from small boats operating close to shore--and this at a time when the big economic catches are being made offshore by large foreign trawlers and factory ships.

(over)

 ABSTRACTER: L. Baldwin

9.19 (*)

BEFORE AND AFTER TORREY CANYON

Croome, Angela
New Scientist 35, No. 562, 569 (September 14, 1967)

A survey team of 14 divers and biologists have finished an on-the-spot inspection of the effects on plant and animal life of the Torrey Canyon oil that reached the western and southern coasts of Cornwall. The object was to learn the effect of both the oil contamination and the chemical countermeasures taken on the life between high- and low-water marks. Samples taken include seaweeds contaminated by oil, by oil and detergent, and by nothing. The floristic structure and the performance of the kelp forest were studied in detail from just below low-water mark to the depth (typically about 75 feet in Cornish waters) where seaward growth is limited. Attention was concentrated on frond growth, the abundance of first-year sporelings (both of which were at a critical stage of development at the time of the ship's grounding), and the sensitive red seaweeds that grow epiphytically on kelp stalks.

The study showed that, where detergent had been applied directly to the shore, the seaweed cover had increased from 40 to 100 percent. Since all the usual species of seaweed were found in reduced quantities, this increase was attributed to invasion by two species of green seaweeds, traceable, in turn, to the reduction in limpets and other seaweed-grazing organisms. Below low-water mark, neither oil nor detergent seemed to have affected the seaweed growth.

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 ABSTRACTER: L. Baldwin

9.4

TRAWLERMAN WANTS FREE REIN TO CATCH FISH

Anonymous
National Fisherman 48, No. 4, 2AA-3AA (July 1967)

This article reports a Puget Sound trawlerman's observations about present conditions and future prospects of the Pacific coast bottom fishery. The trawlerman is the skipper and owner of a 65-ft. trawler, a 78-ft. trawler, and a 75-ft. trawler that is presently under construction. He has been fishing for 16 years and has been the skipper of his own vessel for 13. Among his observations are the following.

The biggest problem facing the trawl fisherman is finding a market for his product. When fishermen are permitted to catch only a certain amount of fish, as he himself has been every year except 1966, they often have to leave a productive area simply because their limit has been reached--if they should take more than they are allowed, the fish houses will not buy the overage. He estimates that he could cut his fuel-oil bill in half if he were allowed to fish without limits.

He reasons that the Northwest trawl industry is healthy. If the trawlermen were allowed to sell their catch without restrictions, they could build their own boats without having to depend on subsidies.

(over)

 ABSTRACTER: L. Baldwin

ANALYSIS OF SOUTHWESTERN ATLANTIC HAKE

EFFECT ON SHORE LIFE OF POLLUTION COUNTERMEASURES

OBSOLETE FISHING SUBSIDIES

A TRAWLERMAN'S OBSERVATIONS ON THE INDUSTRY

9.19

The results lead the author to conclude that chemical countermeasures should have been limited to shore spraying at periods of flood tide, and that detergent need not have been used at all in rocky, seaweed-infested areas.

Rodier, J., M. Maticha1, and R. Benoit (CEA, Centre Production Fluconium, Marcoule, France)
Chemical Abstracts 62, No. 2, 5571e (July 10, 1967)

9.19 FIXATION OF RADIOISOTOPES ORIGINATING FROM A PLUTONIUM PRODUCTION CENTER EFFLUENT BY PLANTS AND FISH

Feld, W. (Bundesforschungs. Fischerie. Isotopenlabor., Hamburg, Germany)
Chemical Abstracts 62, No. 6, 7259g (August 7, 1967)

9.19 RADIOACTIVE CONTAMINATION OF NORTH SEA FISH

8.53 (Cross Reference: 1.53)

are accumulated in the caudal regions and in the subepidermic sections. Similar concentrations are found in the dorsal, post-cephalic, and ventral regions.

Because of the deposition and particular distribution of the adipose tissue in the muscle, and because of the oxidation of the polyunsaturated fatty acids that compose such tissues, the hake cannot be manufactured as a dry, salted fish. Alterations of lipids occur in the slices of hake taken after artificial drying. This alteration causes a natural decline in the value and quality of the manufactured product.

Results obtained from the analysis of manufactured hake flour show that this species is suitable for use in fish protein concentrate because of its low fat content. [12 references]

Lewis, Roger Wolcott (Univ. of California, San Diego)
Chemical Abstracts 65, 1090c (July 4, 1966)

8.53 MARINE LIPIDS. THE FATTY ACID COMPOSITION OF SOME MARINE ANIMALS FROM VARIOUS DEPTHS. GLYCERYL ETHERS OF SOME MARINE ANIMALS

9.4

Midwater trawlers have to move fast through the water if the fish that are netted are to be brought on board. The 300-ft. trawlers that have been proposed for the Northwest area won't be successful because the labor costs of the large crews needed to operate them preclude a profitable operation. Moreover, Northwest fish houses can handle only about 100,000 lb. at a time. Thus, larger vessels will spend several days beside the fish house just trying to get rid of their catch.

He believes that the biggest obstacle to the development of the U.S. fishing fleet is not the Soviet fleets working off the coast of the Pacific Northwest--those operations, he thinks, are so extremely expensive that U.S. vessels can successfully compete with them. The obstacle is imports. The quantity of fish imported into the United States hurts both the fishermen and the fish buyers, who, he suggests, are having to compete with lower foreign labor costs.

The trawlerman cited a Washington State law that limits each trawler to 6,000 lb. of petrale sole per trip. If he catches two or three times that many sole, as he sometimes does, he simply has to throw them back for possible capture by the Soviet and Japanese fleets. He points out how expensive this way of doing business is.

Saving scrap fish that must be thrown back into the sea is no solution to the problem. A vessel would have to work either full time for the fishmeal plant or full time as a foodfish trawler--the two operations cannot be profitably combined. There are very few times, he believes, when he could fill the hold with scrap fish before he would have to bring them in (he ices his fish); returning to port with 2 or 3 tons of fish in a vessel that must average from 15,000 to 20,000 lb. per day to make a profit would be economically impractical.

9.2

Why has the industry been so slow to accept modern fishing methods? he asks. One reason has been that until recently government subsidy policies were largely a form of disguised income maintenance rather than a means of making the industry more efficient. By following such policies, he theorizes, the government has been able to avoid both the problem of persuading individual fishermen to give up the independence of their small boats and work on larger vessels and the problem of moving the fishermen from isolated villages to the larger ports.

The policy of subsidizing the construction of steel trawlers was conceived, he suggests, as much to help the Canadian shipyards as to encourage the fishermen's swing to trawler fishing. Moreover, he adds, any gains from the shipbuilding subsidies have been offset by the granting of unemployment insurance to fishermen. An inshore fisherman can build up insurance credits based on his summer fish deliveries and live on his insurance and other welfare benefits for at least half the year. Thus, on the one hand the government is paying $25 million a year to build large trawlers for the redeployment of an uneconomic inshore fishing fleet, and on the other hand it is paying almost that much in unemployment insurance, which discourages the fisherman from giving up his small boat, and at least as much again for improving small harbors and wharves--yet another subsidy to the inshore fishermen.

He concludes by stating that the central problem is the government's refusal to face the issues squarely. Money is wasted on obsolete but politically acceptable aid to preserve the status quo rather than being spent on new and possibly controversial programs that would steer the industry in the direction it must go if it is to contribute its share toward attainment of national productivity goals.

RADIOACTIVE CONTAMINATION OF NORTH SEA FISH
EFFECT OF RADIOACTIVE EFFLUENT ON FISH AND PLANT LIFE

GLYCERYL ETHERS OF MARINE ANIMALS

2.117 LUXURIOUS LADY NOREEN
BENSON-BUILT FOR EAST COAST DRAG FISHERMAN

Anonymous
Western Fisheries 74, No. 3, 12-14, 16, 18 (June 1967)

A new east coast dragger-seiner, which was built on the west coast, has an unusual method of fishing. The cod end of the trawl is hauled up a fixed stern ramp. On either side of the ramp, in the stern bulwarks, are hinged gates that lead to a chute where the trawl wings are stored. During fishing, the trawl wings are hauled up either side of the ramp by two small wing winches mounted at the forward end of each trough on the same frame as the main trawl winches. When hauling gear, the trawl doors are hung on the gallows in normal fashion; then the sweep wires are transferred to the port side, connected to two pennants from the wing winches, and the sweep wires and wings are hauled aboard by the wing winches until the wings are stored in the trough. The cod end can then be hauled up the ramp for emptying and the required length of trawl is doubled around the faired post at the side of the ramp. If the trawl requires repairs, the bag end can be hauled over to the port side, and another trawl can be shot on the starboard side.

During seining operations, the wing troughs, gallows, and trawl davits are taken off the deck and the ramp opening is closed with a steel shutter. The net storage area is covered with a wooden grating. The deck shelter on the starboard side is removed, a seine davit is installed, and the purse lines are run to a combination purse winch in the normal fashion. [Abstracter: M. F. Tripple]

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3.12 STUDIES ON KEEPING FRESHNESS OF RAW FISH AND SHELLFISH
III - ICING WITH FURYLFRAMIDE AND CHLORTETRACYCLINE
FOR PRESERVING DRIED PRODUCT, "MIRINBOSHI"

Akiba, Minoru, Terushige Motohiro, Tokuo Inoue, and Noboru Kimura
Bulletin of the Faculty of Fisheries Hokkaido University 18, No. 1, 51-58 (May 1967) (In Japanese; English summary)

Saury intended for use as the dry, seasoned product "Mirinboshi" was stored in ice containing either furylframide or chlortetracycline. Each preservative had an antibiotic effect during the early stages of storage; each tended to lengthen the storage life of the product. When oily saury was pretreated with butylated hydroxyanisole, oxidative deterioration of the oil was prevented; the effect did not last throughout the storage period, however.

[Abstracter: L. Baldwin]

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2.6 SEAFOOD DEMAND [THIS IS NO FISH STORY:
PATRONS DEMAND SEAFOOD. GALLUP SURVEY]

Anonymous
Food Service 29, p. 12 (October 1967)
Journal of the American Dietetic Association 52, No. 1, 69 (January 1968)

The results of a survey showed that regardless of income, Americans want seafood in its variety of forms more often than once a week. People with incomes over $10,000 show the greatest inclination to eat seafood more frequently than 1 day a week. Because eating fish is rapidly losing its religious connotation as an act of penance, it is likely that before long people will want seafood all week long, not just on Friday. The seafood processors have lost the durable, Friday fish market, so they have instituted a massive step-up in their promotional efforts. The promotion shows signs of markedly increasing total institutional seafood consumption. People from 35 to 49 years of age show the greatest preference to seafood; a positive correlation exists between the likes and dislikes of this group and of the people with higher incomes. Calorie content of seafood is another factor that should influence the food selection of people in the 35 to 49 age bracket. This aspect, plus the low cholesterol content of seafood, could well be the subject of a successful promotion. [Abstracter: M. F. Tripple]

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3.15 RADIATION PRESERVATION OF FOODS

Anonymous
A Symposium, Advances in Chemistry Series, No. 65, pp. viii + 184 (1967) (American Chemical Society, Washington, D.C.) Price $7
Reviewed by Roger J. Berry
Nature 215, No. 5104, 1004 (August 26, 1967)

The 15 papers presented at a symposium on radiation preservation of foods in September 1965 are published in this book. The papers cover a wide range of topics, and the reviewer considers the quality of the individual papers to be good. Of particular interest to him is a paper by A. F. Novak et al. on the radiation sterilization of fish and shellfish in which the authors point out that radiation processing is not a replacement for quality control in the selection of wholesome products for preservation. Radiation processing will not improve the quality of poor food; it will only retain the attributes of good food.

[Abstracter: M. F. Tripple]

*Items on back of card.

3.11 THE SENSITIVITY OF PSEUDOMONADS
TO ETHYLENEDIAMINETETRAACETIC ACID

Wilkinson, S. G. (Univ. Hull, England)
Chemical Abstracts 67, No. 5, 18760r (July 31, 1967)

3.15 DEVELOPMENT OF RADIATION-STERILIZED SEAFOOD PRODUCTS.
I - ENZYME-INACTIVATED COD AND HALIBUT PATTIES

Stanbuber, R. O. (Oregon State Univ., Corvallis), Mary L. Landers, T. C. Yu, Morris Simon, and Fred Hellgman
Chemical Abstracts 66, No. 9, 36641m (February 27, 1967)

2.6 WHY NOT PROMOTE INDIVIDUAL TYPES OF FISH AND SEAFOOD?

Anonymous
Commercial Fishing 6, No. 8, 24 (August 1967)

A food economist points out that in the promotion of fish and seafood products, the industry should promote the individual types of fish rather than conglomerating them under the general term of "fish and seafood." Use of this general term ignores the individual preference of the consumer. People are rarely heard to say, "Let's have meat for dinner tonight." Rather, they say, "Let's have chicken, or steak, or roast beef." With few exceptions, this is not the case for fish and seafood. Certain shellfish, such as shrimp, scallops, and oysters, are well enough known to be thought of by consumers as individual dishes. However, how often do people say they want a specific fish for dinner? The usual statement is, "Let's have fish." The reason for this is that the various types of fish have not been presented to the public as individual foods.

Fish may not generally appeal to a person's taste, but he may like a certain type of fish, for instance, salmon. The way to sell fish to this person is to promote salmon, which has a specific appeal to his taste. Promoting individual dishes may help increase overall consumption of fish.

[Abstracter: M. F. Tripple]

2.117 FIRST OF FIVE 1000-TON TUNA SEINERS DELIVERED BY YARROWS

Anonymous
Western Fisheries 74, No. 6, 14-16, 54-55 (September 1967)

The first vessel of a fleet of five tuna seiners to be used in the expanding Canadian tuna operations has been delivered. This new seiner has a capacity of 1,000 tons of frozen fish and is among the world's largest tuna boats. At a cost of $2.2 million, the tuna seiner has many improved features, is extensively equipped, and is heavily powered. The fleet will eventually operate in the Gulf of Guinea, off the west coast of Africa. A two-passenger helicopter will be used to scout for the fleet. [Abstracter: A. Reed]

3.15 THE SIX LOOK INTO FOOD IRRADIATION

Anonymous
New Scientist 36, No. 547, 582-583 (December 7, 1967)

At the present time, the commercial production and sale of irradiated food is forbidden by law in the six countries of the European Economic Community. The Netherlands has signed a contract with the European Community for Atomic Energy to conduct a research program aimed at legalizing the sterilization of food by ionizing radiation. The prime investigator is the Netherlands State Institute for Public Health. The Institute must devise methods for determining that public health will not suffer from any harmful side effects that irradiated food might have; the Institute must also test the efficiency and reliability of food irradiation methods. The research program includes a study of the nutritional values of irradiated food and a study of any physical, chemical, or biological changes in irradiated food. The methods to be used by the research workers include differential thermal analysis, spectropolarimetry, and electron spin resonance. The foods to be treated with cobalt-60, cesium-137, and X-ray irradiation and then studied include meat, fish, cereals, potatoes, eggs, fruit and vegetables. Research workers will study food immediately after irradiation and compare it with food that has been stored for 3, 6, and 12 months. [Abstracter: M. F. Tripple]

3.12 PREVENTING DENATURATION OF THE PROTEINS IN FROZEN FISH MUSCLE AND FILLETS. I - EFFECTS OF ADDITIVES ON THE QUALITY OF FROZEN MINCED FISH MUSCLE

Akiba, M., T. Motohiro, and E. Tanikawa (Laboratory of Marine Food Technology, Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido, Japan)
Journal of Food Technology 2, No. 1, 69-78 (March 1967)

Frozen minced fish muscle has acquired a new use as the raw material for making Japanese-style fish paste, such as kamaboko, chikuwa, fish sausage, and ham. Because of the increased use of frozen minced fish muscle, the effect of additives on its quality was studied. Use of a mixture of sugars (5 percent by weight) and alkaline polyphosphate (0.5 percent by weight) was the most effective way of maintaining the quality of frozen raw fish muscle. Egg white (5 percent by weight) was also effective in preserving the quality. Other high molecular weight substances, such as starches, casein, gluten, carboxymethylcellulose, and sodium polyacrylate, showed little effect as preservatives. Olive oil, shortening oil, or lecithin were partially useful as additives when they were added with sugars and polyphosphates. Inorganic substances, including potassium bromate, aluminum chloride, and sodium chloride, were not effective in improving the quality of the fish muscle. A water-leaching procedure prior to grinding the raw fish muscle gave a better product than that produced without leaching.
[12 references] [Abstracter: M. F. Tripple]

3.2349 PILOT PLANT UNIT FOR FLUIDIZED-BED FREEZING AND DRYING

Scott, K. R. (Freshwater Institute, Fisheries Research Board of Canada, Winnipeg, Manitoba); N. W. Tape, and M. M. Aref (Food Research Institute of the Canada Department of Agriculture, Ottawa, Ontario)
Food Technology 21, No. 8, 38-39, 41, 44 (August 1967)

The term fluidization applies to granular material that is transformed from a "fixed bed" to a "moving bed." In a fixed bed, the particles are motionless and support each other; in a moving bed, the particles are suspended in a fluid such as air or a liquid. The advantages of a fluidized bed are higher rates of heat transfer and greater uniformity of temperature than with a fixed bed. A versatile unit, which is capable of freezing, drying, and dehydrofreezing granular material, was required for research and product development. Because such units were not manufactured, a pilot plant drier was purchased and modified to also provide a freezing capability. This report describes the design and performance of the modified unit. [Abstracter: M. F. Tripple]

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3.2349 REHYDRATION OF FREEZE-DRIED FISH

Nishimoto, Junichi (Kagoshima Univ., Kagoshima, Japan)
Chemical Abstracts 66, No. 25, 114709f (June 19, 1967)

9.2 IMPORTS MAKE UP 65% OF 1966 SUPPLY OF EDIBLE SEAFOODS

Anonymous
Quick Frozen Foods 30, No. 1, 119-120, 122-124 (August 1967)

U.S. imports of all edible fishery products between 1956 and 1966 doubled -- from 1,401,000 pounds to 2,800,000 lb. In 1966, imports represented 65 percent of the supply of fishery products as compared with 30 percent in 1956. Imports of groundfish fillets into the United States are now 81 percent of the supply; imports now represent 57 percent of the shrimp supply. The U.S. domestic catch in 1966 was the smallest since 1953. Per-capita consumption of fishery products declined 0.3 lb. during 1966.

Supply of fishery products in 1966

Product	Domestic Contribution	Imports
	Pounds	Pounds
Shrimp	145,000,000	194,963,000
Breaded shrimp	104,040,000	527,000
Rock lobster tails		36,847,000
Fillets	74,945,000	315,000,000
Steaks	9,833,471	53,417,951
Portions	146,637,000	
Fish sticks	81,295,000	(315,098,000)*
Scallops	16,700,000	16,712,000
Crab meat	361,600,000	362,746
Oysters	50,200,000	12,016,000
Brook and lake trout	778,000	4,759,727
Clams	71,600,000	2,801,960
Langostinos		1,500,000

*Imports of blocks and slabs used to make portions and fish sticks.

*Items on back of card.

[Abstracter: M. F. Tripple]

6.1 EXPECT WEAK FISH MEAL MARKET, FAIR DEMAND FOR SOYBEAN MEAL

Anonymous
Feedstuffs 39, No. 39, 59-60 (September 30, 1967)

Market analysts cite several factors that are expected to influence the price of fish meal on the open market. The Peruvians have resumed fishing, and advance reports are that the season will be successful. The Peruvian legislature has reduced the 15 percent export tax on Peruvian fishmeal to 1 percent, effective for the next 5 years. It has also enacted laws permitting the owners of fishing boats to reduce the size of their crews so they can cut costs. The expected good catch of fish and the reduction in taxes and handling costs are reasons for anticipating the cost of Peruvian fishmeal (presently quoted at $123 a ton, sacked, f.o.b. at Gulf ports) to slip to $100 a ton.

The cost of domestically produced meal, in contrast, is expected to remain relatively stable. Because this year's catch has been smaller than the catch a year ago and because most domestic supplies have been used, most observers do not expect the price to decline. However, should inspectors for the Food and Drug Administration find and seize Salmonella-contaminated Peruvian fishmeal in quantities of as much as 1,000 tons, a temporary shortage could ensue, one of the major mixers points out. [Abstracter: L. Baldwin]

*Items on back of card.

9.4 LIST OF FISHERY COOPERATIVES IN THE UNITED STATES, 1966-67

McMullin, Leslie D.
Fishery Leaflet 599, 14 pp. (Revised October 1966) (U.S. Department of the Interior Bureau of Commercial Fisheries, Washington, D.C. 20240)

Since 1948, the U.S. Department of the Interior has annually compiled a list of fishery cooperatives in the United States. This list has included the names and addresses of all known fishery cooperatives. This year the list also includes the following information on the cooperatives: name of one of the officers, number of members, the number of boats owned by members, the type of operation, and the major species of fish and shellfish caught. Only the organizations of fishermen currently recognized by the Department of the Interior as cooperatives under the provision of the Fishery Cooperative Marketing Act of 1934 are listed in this leaflet. [Abstracter: M. M. Gwin]

*Item on back of card.

9.4 THIRD TECHNICAL MEETING ON FISHING BOATS

Schaefers, Edward A.
Commercial Fisheries Review 28, No. 8, 5-10 (August 1966)

(Abstract of this article appears under 2.115 page 5 - February 1968)

6.10 FISH MEAL AND FISH OIL FROM ANCHOVY, ENGRAULIS JAPONICUS IN ISE BAY

Morishita, Tatsuo, Takashi Takahashi, Manabu Kitamikado, and Shiko Tachino (Mie Prefect. Univ., Tsu, Japan)
Chemical Abstracts 68, No. 1, 2067e (January 1, 1968)

6.10 FATS AND OILS IN CANADA

Anonymous
Fats and Oils in Canada Semi-annual Review 2, No. 2, 115 pp. (December 1967) (Edible Oils Section, Food Products Branch, Department of Industry, Ottawa, Ontario, Canada)

6.10 FATS AND OILS IN CANADA

Anonymous
Fats and Oils in Canada, Semi-Annual Review 2, No. 1, 85 pp. (April 1967) (Edible Oils Section, Food Products Branch, Department of Industry, Ottawa, Ontario, Canada)

3.2349 FREEZE CONCENTRATION OF FOOD LIQUIDS: THEORY, PRACTICE, AND ECONOMICS

Muller, J. G.
Food Technology 21, No. 1, 49-52, 54-56, 58, 60-61 (January 1967)

Freeze concentration is a process for removing water from aqueous liquids by freezing out the water as crystals of solid ice. Freeeze concentration is free from the drawbacks associated with evaporation of the water, and it is capable of concentrating comestible liquids without altering the flavor, aroma, color, or nutritive value. Some aspects of this freezing method are the role of freeze concentration, elements of a typical freeze concentration plant, methods of contact (both direct and indirect), quantity of water to be removed, maximum concentration obtainable, solids loss, fundamentals of ice centrifugation, fundamentals of freeze drying as affected by freeze concentration, freeze concentration prior to evaporative drying, and the existing processes, such as the Daubron process, the Gasquet process, Struthers process, mobile unit, Union Carbide process, and the Votator process. [Abstracter: M. M. Gwin]

3.2349 ECONOMIC EVALUATION OF THE UHF DIELECTRIC VS. RADIANT HEATING FOR FREEZE-DRYING

Hammond, Leigh H. (Department of Economics, North Carolina State University, Raleigh)
Food Technology 21, No. 5, 51-52, 58-59 (May 1967)

[Error in the tables of this abstract (which appeared on page 9 - March 1968) can be corrected by deleting the final three zeroes in all the cost columns.]

9.4 LOAVES AND FISHES

Anonymous
Nature 215, No. 5102, 687 (August 12, 1967)

The research report of the White Fish Authority describes a cockle harvester that will enable fishermen to exploit sublittoral beds where density of the mollusk population is low. The report also gives an account of fish-rearing experiments in Scottish lochs and in tanks where the water is heated by the effluent of nuclear power stations. It has been possible to rear a small number of sole to a marketable size in 1 year, a process that would take 3 years under natural conditions. Other projects of the White Fish Authority include the development of fenders so that fish can be transferred from vessel to vessel at sea. The Authority is also concerned with the processing of fish from their initial superchilling at 28° F. to their eventual appearance in sausages and fish products.

The report points out that most of the recent innovations in fishing techniques could have been produced 50 years ago, and it was conservatism, not lack of knowledge, that delayed their development. On the other hand, the Authority is having to pioneer methods of basic research to answer questions such as how ships behave at sea in extreme conditions. Conditions in the fishing industry when the Authority was founded differed little from those in Galilee two thousand years ago. [Abstracter: M. F. Tripple]

9.2 FISHERY STATISTICS OF THE UNITED STATES

Lyles, Charles H.
Statistical Digest 59, 756 pp. (1967) (U.S. Department of the Interior, Bureau of Commercial Fisheries, Washington, D. C. 20240)

Fishery data are compiled and published annually so that information about both the economic and the biological aspects of the domestic commercial fisheries of the United States will be available. The compilation for 1965 is issued as Statistical Digest Number 59; it is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at a price of $4.

9.2 FISHERY STATISTICS OF THE UNITED STATES

Lyles, Charles H.
C.F.S. No. 4400, 75 pp. (March 1967) (U.S. Department of the Interior, Branch of Fishery Statistics, Division of Economics, Washington, D.W. 20240)

This review of the 1966 U.S. fisheries catch includes the following: catch by states; world fisheries, including the estimated world catch from 1960 to 1965; processed fishery products, including industrial products, canned, packaged, and frozen fish, and fishery byproducts; foreign trade, with both U.S. imports and exports and their values; the supply of fishery products, or the domestic production plus imports; value of products, including processed products and imports; prices, including retail and wholesale prices; per-capita consumption; employment, craft, and plants; financial assistance programs, including the commercial fisheries research and development act; fishery cooperatives; and military purchases.
[Abstracter: M. M. Gwin]

2.2 BOSTON FISH PIER TO UNDERGO MAJOR CHANGES IN APPEARANCE

Anonymous
National Fisherman 48, No. 4, 8B (July 1967)

As part of the city's waterfront renewal program, the Boston Fish Pier will be changed radically. The 64-year-old ice and cold-storage warehouse located at the head of the pier will be demolished, taking with it about 1,300,000 cubic feet of storage space. So will the 55-year-old steam-generating plant and an antiquated ice-making plant. The steam plant can still put out 1,000 tons of refrigeration a day, power generators with a capacity of from 450 to 850 kilowatts, put out enough steam to supply the pier's tenants with heat and hot water, and furnish the ice plant with enough steam to free ice blocks from their cannisters. Yet, as a representative of the Boston Fish Market Corporation explained, it is being phased out because electricity from the Edison Company is cheaper than corporation-generated electricity.

To take the place of these facilities, a new automated ice-making plant will be erected, and a new one-story building that houses processing facilities will replace the old eight-story warehouse. The elevated railway system, powered by batteries, that runs along the top of the east and west ells of the pier will still be used to drop ice through the tenants' skylights.

[Abstracter: L. Baldwin]

2.8 SEAFOOD WITH FLAIR

Anonymous
Food Service 29, 28 (October 1967)
Journal of the American Dietetic Association 51, No. 1, 70 (January 1968)

The development and sophistication of processed seafood has had a dramatic impact on the seafood menu. This article contains color photographs and descriptions of the following portioned-fish combinations; haddock Hawaiian with pineapple and curry; country French fish and fries; fish paesan, which is an Italian-inspired spaghetti dish; fish Siberian with a blanket of white sour-cream sauce; curried fillets; king crab salad; white fish Chablis that has only 160 calories per serving; haddock Creole; lobster du Chateau with a sherry-cream sauce; Dover sole with mushrooms and white wine; scallops Mornay; and stuffed trout in wine sauce. Cooking tips for seafood are included in the article in the form of directions for poaching, butter sautéing, pan frying, broiling, baking, and deep frying.

[Abstracter: M. F. Tripple]

2.8 THE EFFECT OF THE PRESERVATION TECHNOLOGY ON THE NUTRITIONAL COMPOSITION OF MUSSELS

Korobkina, G. S., E. N. Danilova, N. N. Kalitina, T. A. Leonova, and G. P. Lukina
Chemical Abstracts 65, 2907d (July 18, 1966)

3.249 CALORIMETRIC INVESTIGATIONS OF THE IRREVERSIBLE CHANGES DURING COLD STORAGE OF FISH

Riedel, L.
Kältetechnik 18, No. 11, 414-415 (1966)
Journal of the Science of Food and Agriculture 18, No. 7, ii-27 (September 1967)

The bound water content of carp muscle stored at temperatures ranging from -2° to -21° C. was studied as a possible index of freeze denaturation in the meat. Enthalpy differences were measured at temperatures ranging from -30° to +20° C.; the values remained constant within an accuracy of ±0.1 percent. Results of the study led the author to conclude that changes in bound water content do not serve as an indicator of denaturation.

[Abstracter: L. Baldwin]

3.249 RAINBOW TROUT (SALMO IRIDEUS) PRODUCED IN FINLAND. I - BACTERIAL SPOILAGE AND AMINO ACID COMPOSITION OF FRESH RAINBOW TROUT DURING REFRIGERATED STORAGE

Niinivaara, Fritz P., Ritva Liisa Sihvola, and Jorma J. Laine (Univ. of Helsinki, Finland)
Chemical Abstracts 66, No. 21, 94052f (May 22, 1967)

3.27 DIELECTRIC THAWING OF MEAT AND MEAT PRODUCTS

Sanders, H. R. (Torry Research Station, Ministry of Technology, Aberdeen, Scotland)
Journal of Food Technology 1, No. 3, 183-192 (September 1967)

The conditions are given for thawing regularly shaped blocks of meat and different meat products by dielectric heating. Blocks of meat up to 15 centimeters thick have been treated by dielectric thawing. The short thawing times and low surface temperatures possible with dielectric thawing have kept drip losses low. Where fat is present as a separate layer, difficulties will arise because of differential heating. This problem may be overcome by mixing the fat with the lean meat. A description of an industrial plant using dielectric thawing is given. [15 references]

[Abstracter: M. F. Tripple]

3.27 THAWING AND PROCESSING OF FROZEN STORED SKIPJACK

Ohta, Fuyuo, Tsuguo Ishigami, Tadao Ueda, Noburo Koreeda, Kanji Takeda, and Yoshitake Hirayama (Kagoshima Univ., Kagoshima, Japan)
Chemical Abstracts 67, No. 25, 115903x (December 18, 1967)

HANDLING FRESH FISH

COOKERY

CHANGES IN FROZEN FISH DURING STORAGE
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3.333 COLOR-SORTING SALMON MACHINE DEVELOPED

Anonymous
Western Fisheries 75, No. 1, 45-46 (October 1967)

The color of salmon, even those of the same species, varies markedly. Since the variability arises from natural causes, it cannot be controlled in the cannery. A uniform color pack can be achieved, then, only by sorting the salmon before they are canned. Such color-sorting should not be difficult, since studies have shown that the redness of the canned fish can be predicted from the redness of the raw flesh.

The Division of Engineering of the British Columbia Research Council, sponsored by the Fisheries Research Board of Canada, has designed and tested a pencillike probe for use in sorting salmon in the cannery according to color. The instrument, which incorporates advanced fiber optics and photosensors, is said to work well in the cannery and to perform reliably even at freezing temperatures.
[Abstracter: L. Baldwin]

3.330 CHANGES IN CHEMICAL COMPOSITION IN CANNED FOODS DURING HIGH-TEMPERATURE STERILIZATION

Andrusenki, P. I., and Z. V. Zvaritch (Kaliningrad Tekh. Inst., Rybnoi Prom. Khoz., Kaliningrad, U.S.S.R.)
Chemical Abstracts 68, No. 5, 21021b (January 29, 1968)

6.52 IRON RESORPTION IN FISH-INDUCED ANAEMIA IN MINK

Havre, G. N., A. Helgebostad, and F. Ender (Department of Biochemistry and the Research Station for Fur-Bearing Animals, The Veterinary College of Norway, Oslo)
Nature 215, No. 5097, 187-188 (July 8, 1967)

The anemia that is caused in mink by diets of raw fish is the result of a hypochromic microcytic iron deficiency. Development of the anemia, and the accompanying achromotrichia (cotton fur), can be prevented by feeding the mink boiled rather than raw fish of the same species. Supplementing the diet of raw fish with vitamins and trace elements is no preventative.

The anemia may develop either through obstruction of the absorption of iron from the intestine into the intestinal mucosa or through disturbance or reduction of the transport of iron from the intestinal mucosa to the iron stores and the hemoglobin-synthesizing tissues. Using the iron isotope Fe as a tracer, the authors compared the absorption of iron by anemic and nonanemic mink that were fed raw and boiled coalfish.

The results of the comparison show that in anemic mink the absorption of iron into the blood stream is higher in animals fed boiled coalfish than in those fed raw fish. In nonanemic mink, iron absorption differences were not particularly noticeable. Studies of the absorption of iron into the intestinal mucosa also revealed pronounced differences between anemic mink fed boiled fish and those fed raw fish. Activities in the intestines led to the conclusion that part of the iron remains bound in the raw fish material. [Abstracter: L. Baldwin]

6.36 SEAWEED EXTRACT HELPS FIGHT FALLOUT DAMAGE

Anonymous
Western Fisheries 75, No. 1, 44 (October 1967)

If absorbed in excessive amounts, strontium-90 can cause bone cancer or leukemia. At a Drugs-from-the-Sea symposium held at the University of Rhode Island, Dr. D. Waldron-Edward, of McGill University, told participants that the tasteless seaweed chemical sodium alginate could provide significant protection against radioactive strontium-90. Used as a diet addition or mixed into puddings or milk shakes as a dry powder, sodium alginate would absorb much of this component of fallout before it could enter the blood stream and reach vital organs. The radioactivity would be absorbed while still in the intestinal tract by the spongelike action of the sodium alginate and passed on before damage occurs, Dr. Waldron-Edward said. [Abstracter: L. Baldwin]

6.36 GROWTH STIMULATORS IN SEAWEEDS FROM THE BALTIC COAST

Dagys, J., I. Karaliute, A. Naickaite, and I. Jodkaite
Chemical Abstracts 66, No. 13, 54572u (March 27, 1967)

7.592 PIGMENTS FROM A SOCKEYE SALMON (ONCORHYNCHUS NERKA) WITH UNUSUAL SKIN COLOURATION

Evelyn, T. P. T. (Fisheries Research Board of Canada Biological Station, Nanaimo, British Columbia)
Journal of the Fisheries Research Board of Canada 24, No. 10, 2195-2199 (October 1967)

A commercially caught, male sockeye salmon (Oncorhynchus nerka) taken in the vicinity of the San Juan Islands was outwardly normal in all respects, except for a striking yellow skin coloration that extended dorsally from the tip of the nose to the base of the tail. The flesh possessed the intense orange-red color typical of the species, and the unusual yellow pigment appeared to be restricted to the skin. Since earlier inquiries had been received about similar freshly caught sockeye and since carotenoid pigments have been reported to cause unusual colors in other marine fish, a study of the carotenoid pigments of the specimen was undertaken.

The properties of the skin pigments were definitely those of carotenoids. The skin pigments differed from the yellow, neutral xanthophylls, taraxanthin, and lutein, which occur as esters in the skins of certain salmonids, and were distinct from astaxanthin, which has been listed as the sole skin pigment of sockeye. It appears likely that the original pigments of the sockeye were yellow xanthophylls or that the more highly oxygenated pigment was a storage artifact derived from the original pigment. [11 references] [Abstracter: A. Reed]

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C. F. T. R. I.
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Created in 1849, the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.